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How to Adjust Shafting.

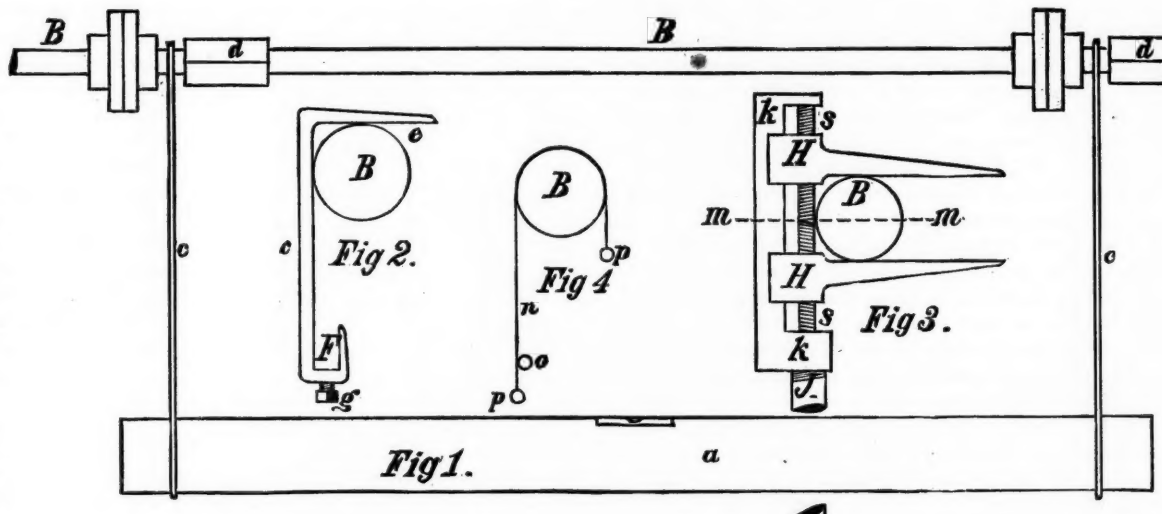
BY F. G. WOODWARD.

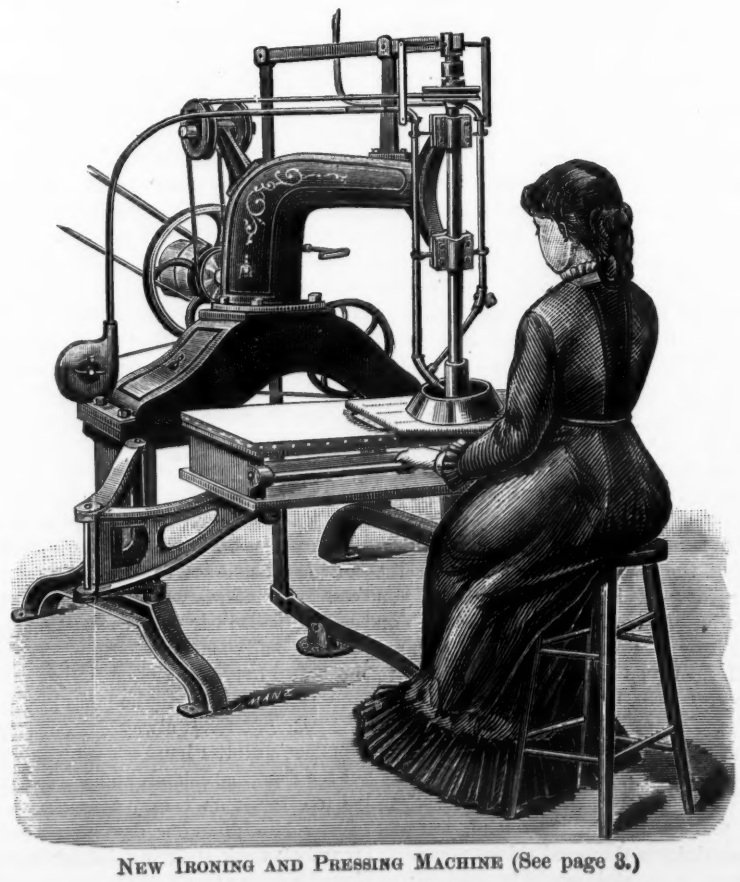
I recently saw an article explaining how to adjust "line shafting," and as the subject is one of much importance to all who work long lines of shafting, I will explain another and a more expeditious method. It consists of suspending a long spirit-level, a, fig. 1, upon the shaft, B, by means of two hook-rods, c, as shown. The level may be a light, straight-grained, well-seasoned board, six or seven inches wide, and as long as one section of the shafting, B, so as to extend from box to box, d, as shown. The rod, c, must be exactly of a length, of course, between the working faces of the hooks, and of sufficient length to bring the level about five feet from the floor, or so as to be convenient for observation. The hooks should be formed as shown in the enlarged view, fig. 2. The top hook being simply a straight offset, e, exactly a right angle with the rod, c, the lower hook, F, must be turned up as shown, so as to keep the level up edgewise. One of the lower hooks should be provided with a set-screw, g, for adjusting the level for different sizes of shafting in the same line; as, for instance, when it happens that the hooks must rest upon shafts of different sizes, place the rod with the set screw upon the smaller shaft, and turn up the screw so as to raise this end of the level just half the difference in the diameters of the shafts.

I have designed a compensating device, shown in fig. 3, which saves the trouble of the set screw. When several sizes of shafting occur in the same line, it facilitates the operation by using this device. The jaws, H H, are worked by a right and left screw, s, by means of the handle, I. The rod, J, is simply a piece of gas-pipe, screwed into the holder, k; a small rod passes through the pipe connecting the screw, s, to the handle, I. It will be seen that the central position, m m, between the jaws will always be the same whatever their distance apart. In proceeding to the work of leveling a line of shafting, the accuracy of the level should be tested at the beginning, by reversing it in the hooks without changing the position of the rods. If the rods are exactly of a length between the bearing faces of the hooks, and the level does not reverse correctly, the correction must be made partially in the shaft, or the points of suspension, and partially in the level; of course, until the bubble retains exactly the same position in both positions of the level. In commencing the work of leveling, the forward hook should not be moved till the second section of the shaft is adjusted; in other words, the rear hook becomes the forward one, and the forward the rear one alternately as the leveling progresses.

To adjust a line of shafting laterally, stretch a strong line parallel with the shaft, either on a level with the shafting, or directly beneath it. If beneath it, throw a fine line with a bob, p, at each end, over the shaft, near each bearing, as seen in fig. 4. If the plumb lines, n, are equi-distant from the parallel line, o, after making due allowance for the different sizes of shafting, the lateral adjustment is correct. If the parallel line is drawn level with the shafting, it should be at such a distance from the shaft as to require the whole length of the rod, figs. 2 or 3, to reach it. The reason for this distance is that the horizontal measurements shall be the least affected by the sag of the line. The line should be drawn to its utmost tension, and it is well to place the ends of the line as much above the center of the shaft as the sag brings the center of the line below, and thus reduce this source of error to a minimum.

Undoubtedly the quickest way to level a line of shafting is to employ an engineer, with his telescopic level and tripod, in connection with the rod shown in fig. 3. If the tripod can be planted so as to command a view of the target, L, when suspended from either of the sections of the line, the adjustment can be most quickly effected. But as this instrument is not often at hand the other method will be found to be sufficiently handy and equally as accurate. If all who have to do with lines of shafting would keep these simple implements at hand, and apply them as above directed, occasionally—viz., a long level and two hook rods—there would not be so much power wasted in driving ill-adjusted shafting.





NEW IRONING AND PRESSING MACHINE (See page 8.)

Extracts from Chordal's Letters.

Mr. Editor:

* * * * I still linger around the Cincinnati Exposition. If an Eastern man fails to make any sales at these shows, and if he fails to carry off any medals, and if he fails to open new lines of trade, he still has the satisfaction of spending a month in a Western city, and can learn much of value regarding Western ways of doing things.

* * * * Cincinnati is a river town, and, like all other river towns having much steamboat work, its machine products is not of a very high order, when taken as examples of skillful work. As far as simple correctness is concerned, Cincinnati is up to date in many things. The position of J. A. Fay & Co. as leading builders of wood-working machinery can be privately allowed, even by competitors.

The sugar machinery made by the Blymyer Co. is probably equal to any made, and the same may be said of the saw mills of Lane & Bodley, the steam pumps of Cope and Maxwell, and the agricultural engines and machinery from a dozen Ohio towns, here represented. But if you want to see nice workmanship you can't find it here with Western brands on it. The elegant workmanship of the Brown engine could not be duplicated in Cincinnati, till the local skill underwent ten years of regeneration; and it might be as safe to say, that Fitchburg would be a century in reaching the exalted position of Springfield, Ohio, as an agricultural implement building locality.

* * * * I have roamed the city shops all over, and don't find one for Cincinnati to be proud of. There are no systematic manufacturing machine shops here, and there are only three that seem presentable to a stranger.

Many heavy old concerns have died the natural death of American shops, and, in many cases, I find some short-sighted men trying to do business on one of these old reputations; when the short cut would be to drop the name, and move to the other end of the city. The old Niles Works here has been dead and gone for years, and a railroad necessity has compelled the condemnation and conversion of the old premises. The Niles Tool Works, which, in reality, first started business right under the nose of the Niles Works, is an entirely different concern, and has a good shop at Hamilton, a few miles from the city. When I saw the old Niles Works building I prayed that more railroads might some day cut into this city.

* * * * Property and taxes are high here, and, as in all other such places, shops move upward instead of moving outward. At J. A. Fay & Co's they have very heavy planers running in the high stories of a high shop. Post & Co's shops were in the sky, and one day the sky part got afire. They poured on water till the fire was out, but the water staid on the top floors. The firemen went home, and men commenced to straighten

things up. They moved the machinery to the center of the upper floor, and found that the floor would not hold everything up at once. The floor gave way, and the heavy stuff went down to the next floor, then through that, and so on, clear to the cellar. I don't know how many men were killed by the accident, but it was a great many.

The value of a single one of these lives would have put up clean, roomy works outside of the town, where men would not have to work on ladders.

* * * * I once worked in a shop having open hatchways through the center of the building, no elevator, mind you—but simply a lot of holes and a hoisting rope. I worked on the engine floor on the lowest story, nearly under the hatchway, and never a day passed but what something came tumbling down into the space supposed to be reserved for my operations. To-day it would be a monkey wrench, to-morrow an oil can, or a dinner bucket, or a lathe chuck, or a portable engine cylinder, or an apprentice, or most anything. One day the whole back wall of the shop fell in, and the shop quit business forever. I have always been thankful, and hope all the walls will fall in, in every shop having hatchways in the middle of the building.

* * * * Lane & Bodley make a nice show here, of machinery for transmitting power. They have an immense open wooden frame, and on it is mounted a sample of most every method of transmitting motion. Every thing is connected and running. It shows power transmitted by belts on flat pulleys; on crowning pulleys; on cone pulleys; and on flanged pulleys; by flat chains on sprocket wheels; by cord in grooved pulleys; by spur gearing; by worm gearing; by bevel gearing; by cog gearing; and by flat-faced friction gears. The display is of the utmost interest to the mechanic. It seems a shame that grooved friction gearing was not included, and one looks in vain for either a crossed, or quarter twist belt. If they would add these things, together with mule pulleys, and a universal coupling, it would be still more valuable. They exhibit a full line of the inevitable ball and socket hangers, etc. The castings are not extra super, and are not intended to be picked at.

* * * * My own exhibit has not received honorable mention by the jury, or dishonorable mention even. They snubbed it. This leads me into the sour grape train of thought. What good are these medals anyhow? Do they deceive the well-posted, or the ignorant? And if they don't deceive, what good can possibly come of them? Half the time the judges don't know anything about the class they are on, and if they do, they will be afraid to speak.

Last week, the officers were trying to make up a jury on steam pumps.

Now, who in the world is green enough to give a public opinion on steam pumps, unless he is too green to know anything about it. In their search they approached every man supposed to be posted, and all backed out. Some said they were interested, others that they were prejudiced, others that they didn't have time. With all respect for the ones they do succeed in getting on this jury, I must say, I pity them. Suppose the Board would pay the jury a thousand dollars apiece, (and they won't pay five cents,) and that there are six exhibitors. They can't give the award to but one of the six, and there remains the ill-will of the remaining five. The good-will of a steam pump man is of value to any man in the engine business, and is not to be sacrificed for the simple and brief honors which judgeship can confer.

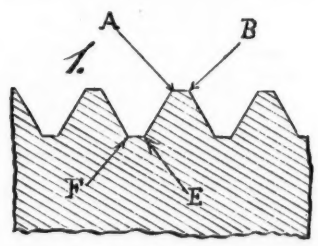
* * * * With all respect for the impartiality of exhibition officers, I would rather be a Cincinnati exhibitor than a New Jersey one. The fact that the Exposition is an Ohio institution is not to be lost sight of. Such remarks don't apply to all exhibitions, of course not. The Franklin Institute, for instance. I honestly believe that a New Jersey exhibitor would stand an equal chance with an Ohio one. Every bit as much—but I would prefer to take my chances as a Philadelphian. They might "sic" committees on me all day in that case, and I could stand the risk.

* * * * The indicator motion for the Brown engine is gotten by that ingenious little lazy tongs arrangement, so long used on the Corliss engines, and so little known of elsewhere. Where the thing originated I know not. Mr. Bacon had one made by Mr. Corliss, or got permission to make one, or something of that kind, and used it on the Brown engine at the American Institute show in New York, and got a silver medal for it too; and I am of the opinion that the one here is the same identical lazy tong. Instead of rigging up temporary swinging or pulley devices which won't fit any other engine, this little affair becomes part of the expert's kit, and closes up like the diagonal hat racks sold on the street for a quarter. In fact, if the hat rack is accurate, and it won't close up if it aint, it is the complete apparatus. There is a hole in the crosshead of the engine, and a pin extension of one of the end pivots of the hat rack. A post is set, say thirty inches from the engine, midway of the crosshead stroke. The other end of the hat rack pivots in a hole in the top of this post, and the thing is done. This can be put on without stopping the engine, if there is only the proper hole in the crosshead. Mr. Corliss' men hitch this thing to mill engines every day, without stopping the engine. The drum cord is hooked to one of the links, which has about the right motion.

If I have time to do it, I will make you a drawing of this thing complete, and will risk the approval of the interested parties.

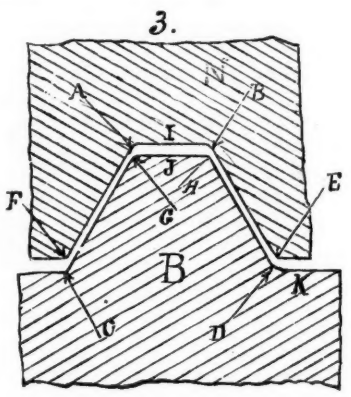
* * * * There seems to be a demand for good machinists around in this section. There are lots of men, but no good ones, idle. Shops want better men than they have got. I haven't heard of any of the shops offering any extraordinary pay for such men, but I am of the opinion that such men can, after their true value is established, set their own pay. Real good men can always get good pay if they go at it right.

* * * * For the benefit of Eastern workmen, who may seek work out this way, I will give a point or two which I have picked up since I have been out here. If you come with a pocket-full of testimonials and recommendations, you can't get a job. If you set yourself up for a genius, you can't get a job If you sneer at the Western style, you can't hold a job. If you go to bragging, you can't stay in a shop. Bosses don't want to

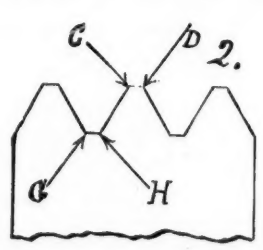


hear what you did in Jericho, but want you to dry up and show what you can do in Rome. Simply coming from the East won't make you a Lieutenant General in the West. The most useless machinists that have ever got into some of these Western shops are crack men from the East. If they were good men, they too often get disgusted, then dispirited, and finally sink to the level of the worst around them. If they were bad, they get worse. Good hard-headed manliness, combined with good horse sense and tip-top skill, will win every time among these shops. Don't brag what you can do, but show what you can do. Don't assume that you are a better man than another, but try and prove it to *yourself*. Don't let on that you miss the facilities you were brought up on, but gradually learn the new way, without ever forgetting the old way. You may be the happy means of improving the shop you work in, but you can't do it by bluster. You must do it by nice management. If you are a skilled man, you ought to learn how to manage your skill, before going into strange countries. If you don't, you will bring discredit on you native place. Bear in mind, that in going West, you go among the smartest and crudest workmen in the world. The minute you set foot in their land, you will find them doing a thousand things you don't know how to do, and would be ashamed to do if you did know how; but you have got to do it, nevertheless, and the men who employ you will be glad when you improve your surroundings. If you could not do well East, you will starve West, and if you did well East, you can do better West; above all things, let your superiority assert itself without the aid of "blowing" from you.

* * * * I believe that these Western folks are right about testimonials. They mean nothing whatever, and, in most cases, are a fraud. I can mention one case as a sample of a dozen within my knowledge. Horace owned the Valley Works, and Bill worked for him. Bill was a good workman and was one of these men who was good in a pinch. If a line-shaft twisted off, or if a gate broke in the water wheel, or if a crane broke down, or if a cylinder-head got knocked out, Bill was the man who would take hold and put forth extraordinary energies till the shop got going again. He was a valuable man. But in his regular work, when work piled up and things got in a rush, he would get on a drunk, and, aside from that, he was the meanest and most contemptible whelp that ever annoyed a lot



of workmen by his presence. Horace put up with it for years, but one day discharged Bill and told him to go the devil! He went, but one day came back and told a pitiful story about home matters and low funds, etc., saying that some little letter, you know, would get him a good place; of course it would. Anything from Horace would do anything, and he had a soft side, so he wrote the stereotyped letter, bearing testimony to Bill's *good* qualities. With this he went off



and imposed himself on somebody, who soon found that Bill was a fraud and Horace a soft cheat.

* * * * How often do we find a foreman who is laboring under the belief that the shop will break up if he don't continue to submit to some evil presence in the shop. It most always takes the shape of some man who has been in the shop so long that he thinks, as the foreman does, that the shop can't exist without him; so he gets ugly and "sassy," and has his regular drunk weeks and his irregular sober ones. His work is always important, and a foreman should never delude himself into the belief that there is only one man of a kind made. Barney worked for George, running gear cutters for ten years. He knew every little trick of the machines, knew every cutter which was a little off and not to be used on nice work, etc. He had his whisky weeks and the gear cutters had their idle weeks. George was tender to all men, but after ten years' cooking he boiled over and kicked Barney out of the shop, and the next day he had a better man on the gear cutters. It always happens that way. Wallace's slotter hand thought he was King of the Cannibal Islands and Wallace thought so too, for it ain't easy to pick up a good slotter hand; but one day, after a couple of years' of weak suffering, he let him go and found a better man right in the shop. Babbit had a man who could run a nice cut right over a six inch shaft, and get nice work out in a hurry. Man was always ugly and Babbit always afraid, for he had seen men fail on that lathe. He screwed up his courage one day and let the man go, and put a smart cub in his place, and found he had been submitting to an unnecessary evil.

* * * * Very respectfully,

CHORDAL.

Extracts from a New Book on Mechanical Manipulation.

No. 3.

BY JOSHUA ROSE, M. E.

* * * An objection which has exerted much influence against the universal acceptation of the United States Standard or Franklin Institute screw thread, and which applies with increased force to the sharp V thread, is that when applied to tools which undergo such severe service as threading bolts and tapping nuts, in screwing and tapping machines. The corners of the thread as at A, B, E, F, on the section of a tap shown in Figs. 1 and 2, are apt to wear too rapidly away, becoming rounded as they wear. Now the wear on the corners at the top of the thread on a tap is greater than it is at the bottom of the thread, because it performs more cutting duty.

First, the top has a larger circle of rotation than has the bottom, and, therefore, its cutting speed is greater, to an amount equal to the difference between the circumferences of the thread at the top and at the bottom. Secondly, the tops of the teeth of tap perform nearly all the cutting duty, because the thread in the nut is formed by the tops and sides of the tap, which on entering cut a groove which they gradually deepen, until a full thread is formed, while the bottoms of the teeth (supposing the tapping hole to be of proper diameter and not too small) simply meet the bore of the tapping hole as the thread is finished. If, as in the case of hot punched nuts, the nut bore contains scale, this scale is about removed by the time the bottoms of the top teeth come into action, hence the teeth bottoms are less affected by the hardness of the scale.

* * * In the case of the teeth on dies and chasers, the wear at the corners C, D, is the greatest. Now the tops of the teeth on the tap (A, B, in the cut,) cut the bottom or full diameter of the thread in the nut, while the tops of the teeth (C, D, in the cut) in the die cut the bottom of the thread on the bolt; hence the rounded corners cut on the work by the tops of the teeth in the one case, meet the more square corners left by the tops of the teeth in the other, and providing that under these circumstances the thread in the nut were of equal diameter to that on the bolt the latter would not enter the former.

If the bolt were made of a diameter to enable the nut to wind a close fit, the corners only of the threads would have contact, as shown in Fig 3, which represents in section (and magnified for clearness of illustration) at N, a thread in a portion of a nut, and at B, a thread in a portion of a bolt, the two being placed slightly apart. The corners A B, are those cut by corners A B, of the tap, in Fig. 1; and the corners C, D, are those cut by the corners of the die teeth C, D, in Fig. 2. Corners E, F, Fig. 3, are cut by corners E, F, Fig. 1, and corners G, H, Fig. 3, are cut by corners G, H, Fig. 2, and it is obvious that the roundness of corners A, B, C and D, will not permit the diameter of the thread at I to meet J, nor the diameter at L to meet K, and the bearings of the threads are at the corners only.

To obviate this difficulty it is said that some manufacturers, employing threads having angular corners, use standard hobs, etc., with the angular corners slightly rounded.

* * * From the excessive duty and wear on the tops of the teeth over the bottoms of the same, and from the small amount of duty performed by the bottoms of the teeth, it becomes practicable to greatly sharpen them by grinding the teeth tops on tapered taps. In a round top and bottom thread the same ex-

cess of duty at the tops of the tap and die teeth occurs, but there is less wear to a rounded than to a pointed cutting tool, the point of the latter wearing more rapidly away than either the angular sides or the round nose of the tool.

A machinist writes us that, by a lady's request, he encloses the following printed clipping for insertion in the AMERICAN MACHINIST, trusting that it will be read by many a brother's sister, and many a mechanic's sweetheart, also suggesting that perhaps some young wives might read it with profit:

"If certain young ladies would study the art of cooking as assiduously as they study the art of decorating their persons, and would spend as much time looking into the science of the culinary department as they spend looking into the mirror, they would not only have less *dyspepsia themselves* which is *occasioned by bad food*, and be more cheerful in their disposition, but they would stand a far better chance of winning the affections of good husbands. Many homes are made places of *misery*, in consequence of *sour bread, burnt coffee, tough biscuit, rancid butter, insipid sauce, and unseasoned dishes in general.* Music is a good thing, and fine talk is a good thing, and an attractive personal appearance is a good thing; but a table that turns the stomach is not just the thing. No lady is accomplished who does not understand the science of good cooking, and who does not superintend her own household. If you wish to make a man irreligious, feed him on bad food. Study the art of cookery more, and etiquette less. Spend more time in the culinary department, and less at your toilet. Love caresses can not be substituted for unpalatable food."

Virtual Velocities.

BY V. HOOK.

Years ago, when I knew much less than I think I do now, I would have been saved many a wild goose chase after mechanical impossibilities and perpetual motions, had I been well grounded on the theory of *virtual velocities*—I think they call it now, or as we then knew it, "whatever is gained in time is lost in power" and *vice versa*. There may be a few of your younger readers who would be benefited by a practical and simple illustration of the same. Several of them are probably champions of some special device for direct ing or utilizing an original force. I used to hear hotly contested arguments in favor of the "screw power," or "hydraulic press power" as the "boss" of them all. Such of your readers as have formed similar preferences for different "powers," no doubt believe in the practicability of perpetual motion, etc. For them this article is intended, as they have something to learn. It will first be necessary for them to learn that—no combination of mechanical devices increases or returns more force or power than is originally applied to it. That, owing to friction, etc., it actually returns less. That it all figures down to a small force acting through a great space, or a great force acting through a small space. The force exerted by a single man might be made to move a weight equal to all the buildings in N. Y. City—strength of material and time permitting. The screw, hydraulic press, etc., are merely devices which require—that a small propelling force move through a comparatively great distance to effect the small movement of a heavy weight. The lever illustrates the action of all mechanical devices to apply power. The device, whatever it may be, is merely the *harness* that makes the strength of the horse available in drawing the wagon; it in no way increases the horse's strength. Thus in Fig. 1 we have a lever, the long end being ten feet, to which is attached a ten pound weight. The short end is one foot and supports a 100 lb. weight. It is plain that—not taking into consideration the weight of the l ever itself, the weights exactly balance each other. If we wish to raise the 100 lbs. one foot, it is plain the ten pounds must move through *ten* feet to accomplish it, as the long end is ten times longer than the short end. From this we can deduct a very useful rule of universal application, as follows: The propelling force, multiplied by the distance through which it moves, equals the resistance or weight, multiplied by the distance through which it moves to balance the former. The practical application of this may be seen in the lever again. Thus we wish to raise 200 lbs. through one foot with the force of ten pounds. To do this it is plain that the ten pounds must move through a greater distance than it did to raise the 100 lbs., and to to this its end of the lever must be greater. But how much greater?—that's the question. Let us apply the rule, which states that the resistance × by its movement must equal the force × by its distance. The 200 lbs. are to be raised one foot, therefore $200 \times 1 = 200$. Now the product 200 equals the product of the propelling force 10—multiplied by the distance it moves through (or the length of the lever in this case). We know one factor of the propelling force, viz.: 10 lbs., and to obtain the other we have only to divide the product 200 by the 10 lbs. to get 20 feet, the length of

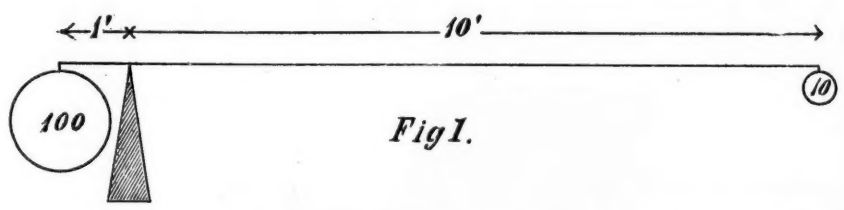


Fig 1.

the lever necessary. It is necessary to understand the lever perfectly, and to do this it must be remembered that, in any of the different forms of the lever, the force and resistance to equalize each other must, when multiplied by their ends of the lever, equal each other—that is the products must; and having any three of the factors we may find the fourth by dividing the couple by the third. What is true of the lever is true of all other devices; it is a mere question of force acting through space. A very useful application of the above principles is in finding the weight that can be raised by a block and tackle.

Notice how many feet a point on the

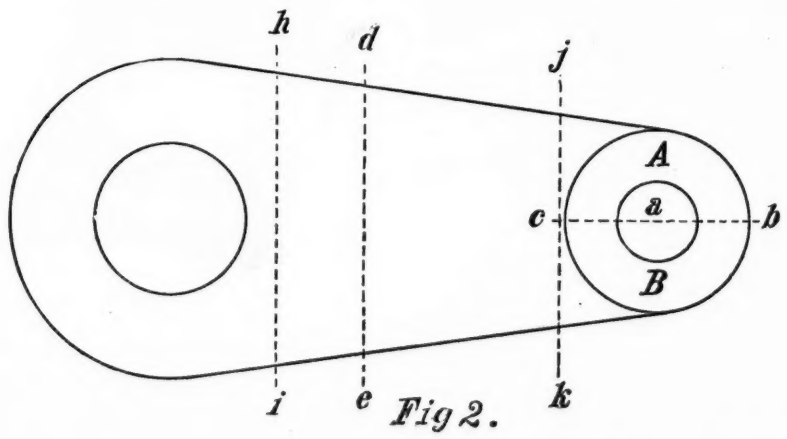


Fig 2.

end of the rope you pull on moves through, to raise the hook to which the load is attached *one* foot. Suppose the point moves through eight feet while the hook moves one, the leverage is 8 to 1, and it is plain that if you exert 100 lbs. with your hands you will raise a load of $8 \times 100 = 800$, but your hands pull the rope through *eight* feet, and your load (which is eight times the power) moves through but *one* foot. The combination of the screw and lever comes under this rule. Thus notice how many inches the end of the lever, to which the power is attached, moves through to advance the screw *one* inch Suppose it moves through 100 inches, the leverage is 100 to 1, and if you pull 100 lbs. on the lever you will lift $100 \times 100 = 10000$ lbs., *but only through one inch while your power travels through* 100 *inches.*

The wedge's force may be ascertained, by dividing the distance it travels into the log being split, by the distance the crack or split opens; the quotient is the leverage or advantage, which, multiplied by the force of the blow, equals the rending or splitting force. Again, the pressure on an engine's piston ×, by the space it moves through in a given time, is the power it exerts, theoretically. If we wish to double the force of an engine, we double the number of feet the piston travels in a given time, or we may double the steam pressure; thus × increasing the force, or the distance traveled in a given time, increases the effect proportionally.

This leads me to another application to which these principles can be applied. In designing, for instance, the crank of a stationary engine, suppose the pressure on the piston is 20,000; this is transmitted by the rod, etc., to the pin A. This strain on the pin has a tendency to fracture the pin put through the line c b; that is, lift or tear the part A from the part B. The safe tensile load for cast iron is about 2,000 lbs. per square inch of section; hence, to have the hub large enough, it must present an area of solid metal of $20{,}000 \div 2{,}000 = 10$ sq. in. The portion or section of the crank, j k, may be ascertained by considering the crank a beam, fixed at one end and loaded at the other. The section d e must be twice as strong as j k, as it moves through but half the distance that j k does, and the section h i, moving but one-third the distance, must have an area of three times that of j k. Thus, in designing any machine, after ascertaining the motion and strain on the leading part, we may proportion the balance from it.

I am glad to see Chordal advocate scraped surfaces. It is frequently asserted, by men who ought to know better, that a slide valve and gear need no scraping, as if planed so that the tool marks will cross, they will wear to as good a surface as a scraped one. To the eye they may be as good, but I never saw an unscraped valve yet that did not leak from the time it was put in till it was taken out and surfaced properly. The trouble is, that while the valve is wearing off a high spot on the seat, it is wearing a corresponding groove in itself, and the groove leaks after the high spot is worn away.

Mr. Hoffman, in his valuable article on "Proportions," in your August number of the 30th, speaks of the slide valve as used only in locomotives and stationary engines "when fuel is of little or no account." I have seen common slide valve engines, with the automatic cut-off governor attached, which gave cards and actual results seldom surpassed by the best automatic engine built. I recall now a large high pressure stationary, driving a railroad shop: cylinder 18x30 in., with fixed cut-off (riding valve), which was altered by taking out the cut-off valve and attaching an automatic cut-off governor—Stewart's, I think—which effected an economy of something over 50 per cent. in fuel, and gave most beautiful cards.

One of our exchanges mentions an iron foundry in Canada that was recently stopped by a lot of eels getting in the forty horse-power water wheel. The managers of that foundry should add the casting of nets to their other specialties.

New Ironing and Pressing Machine.

On a recent visit to the Chicago Exposition we were interested in observing the method of operating the machine herewith illustrated, and reproduce it here for the general information. (See first page.)

The machine was invented by Mr. E. L. Wilson, of Chicago, and is intended for use in large laundries, shirt manufactories, hotels and institutions, and may also be used for pressing seams in men's clothing, ladies' cloaks, &c.

The iron revolves with the spindle, connected with a compound lever, enabling the operator to bring any required amount of pressure to bear upon the work.

The ironing table rests upon two double-jointed arms, and has a universal lateral movement, by which the work is brought under the iron at the will of the operator.

The iron is of circular shape and hollow, and is heated by burning gas, the supply of which is received through a blow-pipe of scientific construction, producing complete combustion without soot or waste of gas.

The machine has been long enough in use (about 18 months) to have demonstrated its practical usefulness, and to have received such slight improvements as experience has shown to be necessary.

Ordinarily, in laundries, three or four days' work is a severe week's work, while with this machine work can be done more continuously (as no time is lost in heating and cooling off irons), and with much less fatigue to the operator.

Its makers claim that, with a monthly consumption of 1,000 feet of gas (the cost of gas averaging about $3.00), and running ten hours per day through the full month, one machine will do the work of four operatives working by hand. The machine will readily iron an open-front shirt or a shirt with collar, which is a desideratum in a machine of this kind.

The operation of the treadle and adjustment of the table can readily be seen from the illustration; the power required being small, being about half a horse power.

The laundry machinery interest is an important and growing one, and any machine which is calculated to keep the average laundryman up to his promise to return the public's clothes promptly every Saturday night in time for choir meeting or evening calls, is, without doubt, a public benefaction. This particular machine is made by Wilson & Evenden, 47 and 49 West Lake St., Chicago, Ill.

Chicago men, when they went abroad, used to boast of the hog-killing machines in that salubrious city, which handled a pig so quickly that the unfortunate animal's squeal was almost simultaneous with the sound of the dropping of hams in the barrel. The calm light of science when shed on this story, has long since shown it to be—to put it mildly—somewhat exaggerated. No sane man doubts that Chicago is the greatest city in the world for hogs, but the continued increase of population in the Western Gotham shows conclusively that there is no such swift hog-killing invention in use in that city. Still, invention is doing much for the hog. Recent patents show that that animal has a great deal to be thankful for. The new hog-scraping engine is a wonderful work. Incredible as it may seem, it will take the hair off quicker than the most popular hair restorative (seventy-five cents a bottle; two bottles for a dollar). The hog is the most bald headed animal in existence after a brief interview with this machine. On the trial trip of the invention it whisked the bristles off seven hogs in fifty-seven seconds. No hog can complain of this machine as a tardy barber. It is expected that when it gets right down to work it will polish off 6,000 hogs in ten hours, and it will polish them off so carefullee, that now it is the ruler of that hoggeree—commonly known as Chicago.—*Detroit Free Press.*

The water-works election held at Martinsville, Ind., resulted in forty-two majority in favor of water. The proposed enterprise, according to estimates made by the hydraulic engineer, will cost a little over $12,000.

Improved Double Cylinder Traveling Bed Surfacing Machine.

The Revolving or Traveling Bed Planing Machine, illustrated on this page, generally known as the Farrar Planer—the name of its maker still adhering to it—is one which, by its general use, indicates a popularity not yet supplanted by any other method of planing lumber to which it may be especially adapted.

In surfacing lumber, it is said to have no superior in speed and quantity of product; and where large quantities of lumber are to be dressed, more can be done by the same expenditure of power than by other methods of construction.

The single cylinder traveling bed planers are universally known among lumber manufacturers, their merits and capacities having been tested by the most expert and critical operators, they always proving their powers by the excellency and quantity of product.

In this issue we present to our readers an opportunity for the study of a planing machine, which is attracting much attention among lumber men; and which, it is claimed, will reduce largely the cost of dressing one or both sides of lumber. It has been recently perfected and brought out by the widely-known wood-working machinery builders, Messrs. J. A. Fay & Co., of Cincinnati, Ohio. Its great novelty consists in its capacity to plane one wide, or two narrow, boards of equal, or unequal thickness simultaneously, at the same instant of time.

As its title indicates, this machine has two cylinders, one for dressing off the upper surface of the board, and the other for dressing off the lower surface of the board, as it is passed through the machine; the feeding power is conveyed to the revolving bed, constructed of heavy iron slats, or rolls, flexibly connected, by links or hinges, to the slats, which are carried in the direction desired by a toothed wheel upon a shaft, properly geared, to produce the correct speed of the lumber. The bed moves over slats, placed in a position to produce even wear upon the surfaces, and as little friction as possible, considering the friction produced by the rollers, which are placed upon either side of the upper cylinder.

The rollers receive their pressure from heavy involute springs, regulated in their passage by screws. The roller before the cut is divided in its center, forming two rollers, and is termed a broken roller; they are supplemented by a divided pressure bar, which also forms a most effective chip breaker.

This arrangement of the initial roller and the pressure bar is of vital importance, in that it enables the operator to feed in two boards of unequal thickness at the same time, thus equalizing the wear of the machine, and almost doubling its capacity, from the fact that one board can be fed in where the divided roller and pressure bar are not used.

The upper cylinder, with its roller and pressure bar, is raised on an angle to retain the proper function of the belts by two screws operated by connected gearing. The pressure bar over the under cylinder also moves up with the upper cylinder, and is swung on hinges to be easily removed when access to the upper cutter is necessary; it has also a separate adjustment to regulate the pressure.

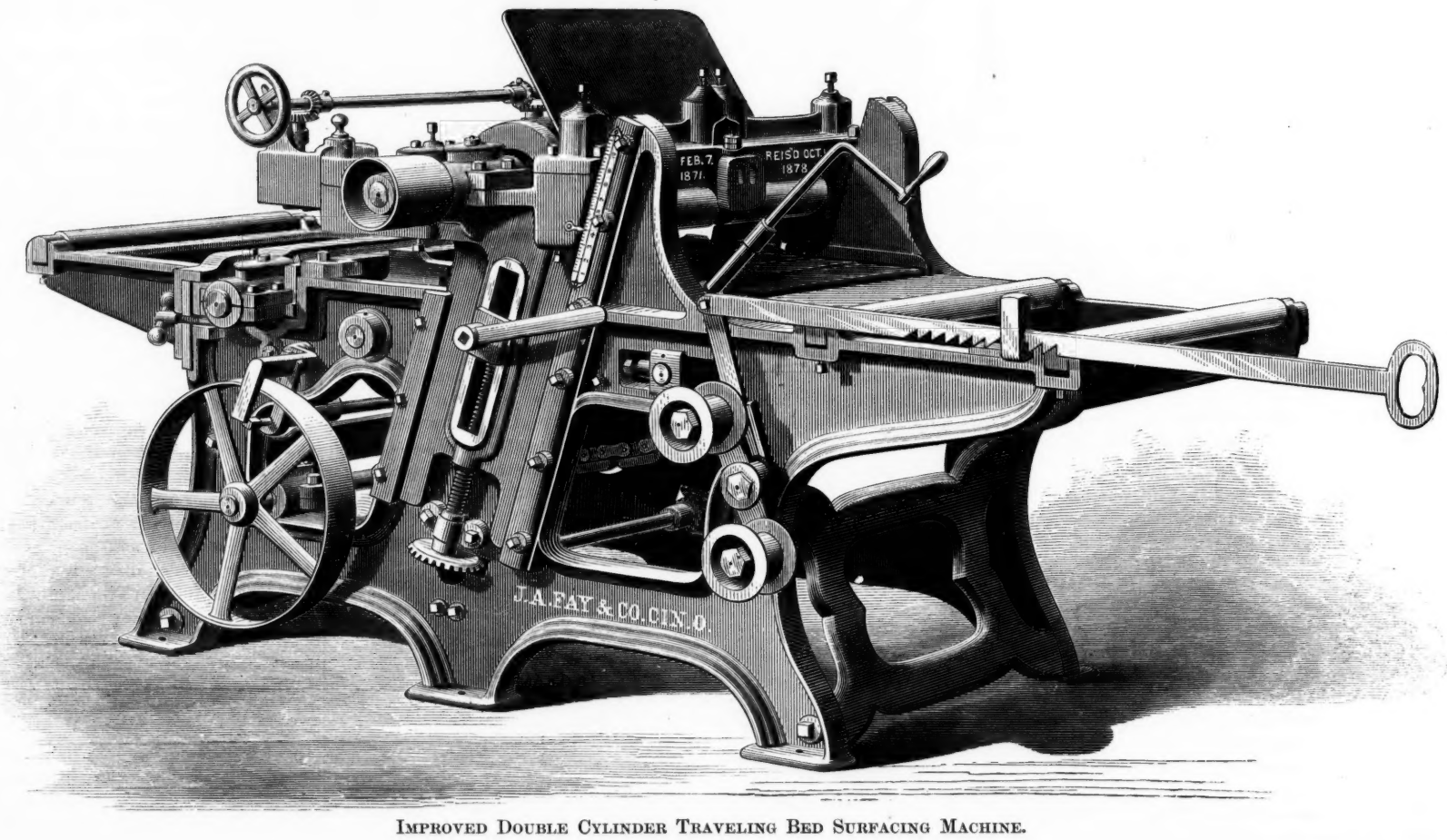
The bed and under cylinder are upon the same plane, and stationary, so that when adjustments are made for different thicknesses of lumber there is no difference to be made for the height of the feeding-in-table.

The lower cylinder has an independent adjustment to regulate the thickness of the cut taken from the lower side of the lumber.

Both the end of the machine and the pressure bar over the lower cylinder are hinged, and can be swung entirely out of the way without the necessity of removing bolts, for convenience of sharpening the cutters, or removing the lower cylinder.

This machine is the subject of several patents; the last two were granted by the Patent Office in October, 1878, aud April, 1879.

Messrs. J. A. Fay & Co. guarantee this machine as being capable of dressing fifty to sixty thousand feet per day. For further particulars address the manufacturers, as above.



Improved Double Cylinder Traveling Bed Surfacing Machine.

Hints Respecting Mill Dams.

That a mill dam may be secured against being incapped with ice, it is recommended that the top be made perfectly level. To secure the cap-plank as fast as possible it is best to place three timbers on the top of the stone-work, one forming a face on the down-stream side and the other in the middle, and the stay-timber of both the cap and the up-stream plank. As nails are liable to be broken by frost, pins made of some suitable wood are generally considered preferable as a fastening to the cap. There should be five or more pins in each plank, and the cap-plank should be pointed to the others so as to be as near tight as possible, in order to prevent the water from running down among the stones and freezing during the winter. The force-plank should raise a sufficient height above the upper timber, to be even with, and a protection to the cap-plank. The slope or inclination should be such as to leave about four feet width at the top. The planks for the face, as well as the cap, should be round and thick. They should also be neatly "scribed," so as to fit the rocks at the bottom. Some fill in earth on the up-stream side of the dam to answer the purpose of planks, but it is generally observed that such dams soon leak and are not durable.—*American Miller.*

Gleanings from the Foreign Press.

Portable and Traction Engines.

The following method of construeting the carriages and brackets for carrying the crank shafts of engines of this class is adopted by Messrs. Clayton and Shuttleworth, of Lincoln. The bracket is firmly bolted on to the boiler, and on this bracket is mounted the carriage, which is secured from lateral movement by a tenon fitted in a mortice or groove in the bracket, and from vertical movement by flat-sided bolts, which pass through the tenon and the sides of the groove in the bracket. These bolts tightly fit the respective bolt-holes, except at the part where the bolts pass through the tenon, at which place the bolt-holes are made longer than the width or diameter of the bolts, thus allowing the carriage to slide longitudinally on the bracket, as the boiler expands or contracts whilst, at the same time, the distance from the cylinder to the center of the shaft is preserved by a stay in the usual manner.—*Universal Engineer.*

Krupp's Homogeneous Iron.

After a long series of successful experiments, Krupp has placed his "Fluss-Eisen" upon the market as a substitute for malleable iron. With a content of about one-tenth of one per cent. of carbon it resembles the best forged iron, but is superior to it. In large forged pieces it has a resistance of from 38 to 42 kilogrammes per square millimeter (54,046.7 to 59,735.8 lbs. per square inch). In sheet iron the tenacity is raised to between 40 and 48 kilogrammes (56,891.3 to 68,269.5 lbs. per square inch), with an elongation of about 25 per cent. and a diminution of 50 per cent. in the section of the experimental bar at the moment of rupture. The price is little higher than that of ordinary iron. The material is specially valuable for shafts, stern-posts, anchors, machinery, and all work which requires welding when it is made of common iron.—*Ann. du Génie Civil.*

A correspondent of the *British Trade Journal*, after a trip through Holland, writes among other things: "French and German goods are in the ascendant, and the display of English goods was limited to proprietary articles. The Americans, however, have got in their cheap clocks, chair seats made of perforated veneering, a few tools, and other specialties, and I understand that they have started an agency in Rotterdam to show samples and push their trade.

On questioning the shopkeepers I found that their objection to English goods was the price, but that if they could be met on this point, they would be quite willing to substitute English goods for those of Germany, as they had confidence in the quality of the former.

Holland manufactures little or nothing except paper and a few cotton goods, and puts up with the German article because it is cheap; but the cutlery, tools, cooking utensils, and all builders' furniture are most inferior. There are but few travelers for English houses, though there is an opening if native shapes and wants be studied.

Celluloid, a new material much used in the United States for various surgical appliances, has been introduced, though it is not yet adopted in England.

At Rotterdam I saw a certain quantity of agricultural machinery, but half of it was of German manufacture. Orders are the result of pushing opportunities as they arise, and I am convinced that a couple of energetic young men, with but moderate capital and good credit, might reap a rich reward by establishing themselves in Rotterdam with a small stock of English goods, but a varied selection of samples of our minor industries suited to the demands of the population.

Holland is particularly well adapted to the drummer class, as the towns are near each other and locomotion cheap."

Portable Gas.

In England portable gas is now sold and delivered like milk. Country residents receive it from the city in copper cylinders.—*Fortsch. d. Zeit.*

Our latest foreign exchanges speak of further reductions of wages in the cotton and iron districts, and the emigration of bodies of skilled workmen to America. None of these journals advance any plan to prevent such emigration, but one of them urges that it should be diverted to British Colonies.

Wages of Ironworkers.

An official estimate of the wages of iron-workers generally paid contains information respecting Darlington and neighborhood, including a detailed statement of the extent to

which the various classes of workmen are employed, the hours of labor where piece-work does not prevail, and the average wages. In puddling, for instance, it is stated that 33 per cent. of the workmen employed are puddlers; 33 per cent. are underhands; and laborers, drawers, coal-wheelers, etc., comprise the remaining third; the wages of puddlers being given at 33*s.* per week, and those of underhands at 17*s.* per week. At the present juncture the chief interest attaches to the return which is given as to the wages in the plate and sheet-rolling trades, as under:—Rollers and bloomers, 16*s.* to 28*s.* average wages; furnacemen, 10*s.* per day; shearers, 12*s.* to 20*s.* per day; bolterdown or rougher, 10 hours per day, 35*s.* 6*d.* per week; heavers-over or hookers, ditto, 21*s.* 6*d.* per week; helpers, ditto, 30*s.* per week; wheelers, pilers, and chargers, ditto, 18*s.* to 20*s.* per week; pullers-out (bogiemen), ditto, 21*s.* per week; door-drawers (lads), ditto, 8*s.* 6*d.* per week; plate-loaders, ditto, 16*s.* 6*d.* per week; weighers and stocktakers, ditto, 28*s.* per week; roll-turners (lads), ditto, 12*s.* per week.

Improved Adjustable Reamer.

In the production of duplicate articles, based upon a uniformity of parts, we can safely assert that in this country greater advance has been made than abroad. We refer to sewing machines, fire-arms and other like products, the cheapness of which has been entirely based upon a thorough interchange and duplication of parts.

To attempt to apply a like system to ordinary machine production would, of course, be out of place, but the advantages of the system can be obtained in a large share of the fitting done in every shop.

The implements for making holes and fitting cylindrical work will be found to constitute a large share of the tools in a first-class tool-room. Drills, taps, reamers, mandrels, standard gauges, etc., are employed for this purpose.

Aside from the reduced cost of producing work by improved systems, a matter of equal interest is the fact that the investment in such tools is in many cases less in a well-equipped shop than in one without any system.

The letters from our correspondent, "Chordal," have very graphically depicted the way in which work is made to cost by an entire want of order and system, and forcibly brings to mind the accumulation of broken taps, reamers in all conditions of accuracy, a lot of iron stored up in mandrels ready to be fitted to each job, and many like deplorable conditions which can not exist much longer in the competitive state of the machine business.

The possession of standard gauges alone does not, however, mean, or insure uniform cylindrical fitting, unless the implements for making the holes are adapted to their purpose, and are kept to conform with the gauges.

As reamers are now very generally acknowledged as the cheapest means of finishing holes, they deserve especial attention. For many years the leading shops throughout the country have employed reamers with adjustable blades, these reamers being made at a great cost, but considered so essential as to warrant the first investment. There is no doubt that they have proven cheaper in the end, as the same set could remain in use indefinitely, new blades, of course, being occasionally required.

The lower price of "solid" or fluted reamers has led to their almost universal adoption, and has accomplished a great deal in advancing the general character of machine fitting, but they are hardly consistent as implements for maintaining *standard* sizes. It is, of course, intended when they have become badly worn, that they should be annealed, re-set, hardened and ground again to size; but unfortunately this is but seldom done, because of the high skill required to perform these operations, but more generally for want of proper appliances.

Owing to this feature of "solid" reamers, when used with a system of standard gauges for fitting, it was deemed necessary by the Betts Machine Co., Wilmington, Del., now making standard gauges, to prepare a special plant for making adjustable reamers with a view of furnishing them at low prices to those desirous of adopting their system of gauging implements.

The arrangement of the reamers is of the type that has been, from years of experience, found best for the purpose.

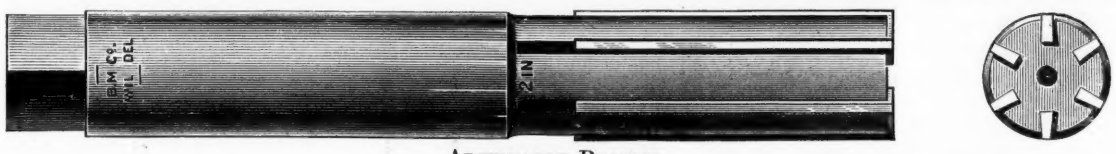
The shanks are ground to standard size, and become a "check" to the use of the reamers when they require re-adjustment. This will permit a limit of uniform accuracy to be adopted in different classes of work, the amount of expansion becoming an exponent of this.

After reamers of this kind are adopted the use of hardened steel mandrels becomes a practicable matter, and the importance of this we need hardly emphasize here.

The engraving on this page represents the general plan of the reamer. The blades are dove-tailed in, and lay on a tapering bottom, and are drawn towards the shank in being expanded. Duplicate blades can be re-inserted at any time in case of being broken from maltreatment, or becoming worn out.

We understand the prices for the reamers have been fixed at about 15%. in advance of the lists used for solid reamers.

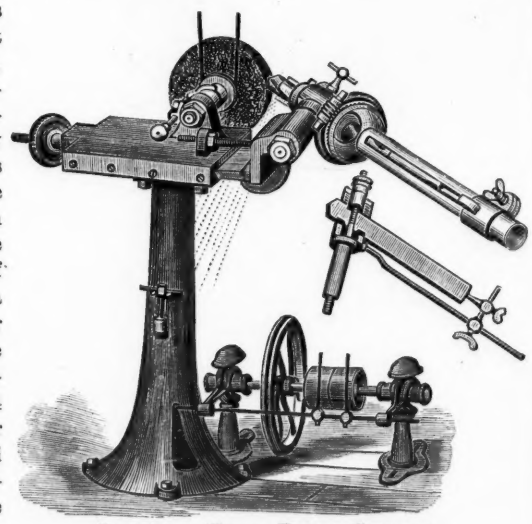
The Betts Machine Co. of Wilmington, Del., will afford further information to those interested.



ADJUSTABLE REAMER.

Improved Twist Drill Grinder.

The cut herewith shows Eddy's late improved Twist Drill Grinding Machine. The original machine was illustrated and described in the first issue of the AMERICAN MACHINIST, November, 1877. As now constructed, drills of $\frac{1}{16}$th to $1\frac{5}{8}$ inches (inclusive of any diameter) are securely held in a chuck. When the drills are ground, they are of the same angle and length, and to center with clearance increasing away from the cutting edge. This secures holes of same diameter as the drill, and a durable edge not likely to break or wear quickly. Flat drill holders are furnished to accompany the machine, that grind from $\frac{1}{4}$ inch to 4 inches in diameter. The operator simply places the drill to be ground in the chuck, with the lip about parallel to the holder, and having the cutting edge of the lip $\frac{3}{8}$th of an inch above the top of the jaw, tightens the drill in the chuck very lightly, which is sufficient to hold it while being sharpened. This machine is manufactured by Wm. H. Eddy, 81 Exchange Street, Worcester, Mass.



IMPROVED TWIST DRILL GRINDER.

Letters from Practical Men.

Editor American Machinist:

I am somewhat surprised at the views "Chordal" advances on the subject of cheap engine indicators, having always considered him to be liberal minded, but after the bit of sarcasm in which he indulges, in your issue of the 11th inst., I have come to think that he is rather orthodox.

I hold that, from his mechanical experience, he must know that with the machinery of to-day, and the system of interchangeable parts in the manufacture of standard articles, an indicator can be produced possessing all the requisites he names, viz.: known resistance of spring, known area of piston, correct transmitting motion, conforming scale, and, I will add, an instrument as pleasing to the eye as any in the market, which can be sold at one half the present price and still leave a very wide margin of profit for the manufacturer.

I claim that were such an instrument made, the increased sale would more than compensate for difference in price. There are many competent engineers and others, myself among the number, who would purchase at a reduced price, and in whose hands the instrument would be a great gain, both to themselves and employers, but the high price is a great stumbling block.

Many users of engines cannot be brought to see the utility of an indicator except by actual application, and they will not put out "the hundred dollars or so for an expert's ton of data;" but if marked results were seen in the coal pile, from the use of it in the hands of their own engineers, they would gladly avail themselves of its advantages.

Perhaps "Chordal" is interested in the protection of aforesaid experts. If such is the case, I pray that he may be endowed with a more liberal mind.

North Plymouth, Mass. H. S. Dix.

SUPERINTENDENT'S OFFICE,
SHAFTON COAL CO.
SHAFTON, PA., Oct. 10th, 1879.

Editor American Machinist:

I notice in my paper of this week an article from Wm. H. Hoffman, on the practice of using stud bolts in the flanges of cylinders of steam engines. He seems to think that T headed bolts would answer the purpose better. In the course of twenty years' practice, I have had an opportunity of testing the merits of both, and would say use either studs or bolts with square heads. T heads may do very well where they are not seen, but on a cylinder they would be a perpetual eyesore to an owner that had some taste in the looks of his engine. Ten to one after the engineer has screwed on the cover if you don't find one side of the T projecting, over the flange all around, even if the bolt holes are bored pretty close to the body of the cylinder. Mr. H. says, that if it is proper to screw bolts into cast iron it is just as correct to use cast iron nuts. Every machinist knows better. When a stud bolt is screwed into a cylinder flange, it is not intended that the thread in the flange will be subject to wear, the stud being stationary. I would also humbly state that Mr. H's hope—to have the practice of tapping cast iron entirely discontinued—will never be effected; there are occasions on which it is necessary, as well as judicious.

There is one suggestion in his article worth consideration, and that where he speaks of using square-headed bolts let into the flange the full thickness of the head; where this could be done it would be both neat and prevent turning.

Since I became a subscriber I have been very well pleased with the AMERICAN MACHINIST. There is a great deal of solid information for those of a practical turn of mind, which will amply pay at the end of the year for all it costs.

Yours truly, ROBT. RAMSAY.

Editor American Machinist:

Perhaps there are some of your many readers who find it difficult to anneal cast steel soft enough to work to advantage.

The writer of this works a great deal of cast steel in the manufacturing of dies and other tools, and has found the following process to be the very best for reducing the carbon in steel, not injuring its qualities the least, but rather adding to its advantages:

1st. Get a cast iron box, of suitable size, with a cover fitting it as snugly as possible.

2d. Put in the box a layer of charcoal dust about one inch thick. Place the same amount of fine, dry sawdust on top of the latter.

3d. Heat the steel in a slow charcoal fire until it becomes a cherry red, then lay it in the box on the sawdust, adding another layer of sawdust and charcoal dust on top of the steel. Place the cover on the box, and cover the same with ashes or coal dust.

For annealing pieces of steel, say, 3x3, 1″ thick, the box should remain covered about 35 hours. At the end of that time the steel will be found to be very soft and in good working condition.

Perhaps it is not generally known that cast steel can be decarbonized by putting it through the above-named process, using white clay to cover the box, and baking the whole for 60 hours. But this is not wanted. What steel workers want is to have steel soft enough to work without turning the edge of their working tools, or breaking the same.

The common way of annealing cast steel is to place it under some ashes or coal dust on the blacksmith's forge, oftentimes taking it out before it is cold and throwing it on the damp ground to cool off. This is a very poor way.

In my next I will write you in relation to tempering steel. A. PHELPS.

Newark, N. J.

COHOES, N. Y., Oct. 13th, 1879.

Mr. Editor:

I see that slips are still in order, so I will venture another, one that I think will be useful in jobbing shops, where a man has to do all kinds of work, forget his orders, and go to the foreman three or four times for a renewal of the same before he gets his job started, and when it is finished has to be altered, because he (the man) misunderstood the order.

I think a slip like the following, will be useful and handy to have in the shop: If Mr. Wilson comes and orders a 20″ pulley, 5″ face, 2″ hole, tight or loose set-screw or key-way, we take our slip and fill it out as shown.

ORDER SLIP OF JAMES WILLIAMS.

Date, Oct. 13th, 1879.	Wght.	Hrs.	Min.
Make for Mr. K. Wilson	35 lbs.	....	25
1 20″ Pulley, 5″ face, 2″	.....	1	20
1 ½ Set-screw	.....	....	30

It is given to the foreman, he sends it to the foundry for the casting, it comes back with the casting and is given to the men in succession, who perform the different successive operations until the pulley is finished and ready for delivery; the weight of the casting is marked on it when it leaves the foundry; the time for boring, turning, drilling, tapping, or slotting, as the case may be, is all put down on the slip as it passes from man to man, and when the job is finished you have the correct amount of stock, and the correct amount of time put in on the job, and you can always be positive the job is just as ordered.

If it is desired to get the amount of time occupied for each operation, the slip can be made large enough, so that the names of the different processes performed in a machine shop, or the symbols, such as used by Messrs. Cope & Maxwell, can be added, and the amount of time occupied by each process can be written opposite its name, or symbol.

GEORGE GUNTZ.

Russell's Steam Valves and Gate Valves.

The first illustration on this page exhibits Russell's patent steam valve, which has gained considerable celebrity. A is the disk and sleeve holder; B, a movable brass sleeve closely fitted to the holder A. The disk which forms the effective bearing surface of the valve is designated C. It is made of patent composition, and is wholly enclosed within the self-adjusting sleeve B, by means of which the disk is prevented from being flattened out by pressure, and is protected from being cut by the steam. E is the confining nut which holds the disk in place; but is readily unscrewed, whenever it is necessary to remove the disk or put on a new one.

The advantages claimed for the valve are: First, that the disk will not stick to the valve seat, and will keep tight under hot or cold pressure. Second, that the composition disk contains over 80 per cent. of metallic substances, and yet is sufficiently elastic to make a tight joint over an uneven surface. Sand or grit will sink into the composition and thus not injure the valve seat. Third, that the composition disk is fully protected by the brass sleeve, so that its shape is preserved from distortion and its wear lessened. At the same time the sleeve yields as the disk slowly wears down, and by thus adjusting itself constantly maintains its hold upon the disk and protects it from being cut by the steam. Fourth, the valves are made in a thorough manner and by a perfect duplication of parts, so that there is but little trouble or expense in removing any part that may wear out.

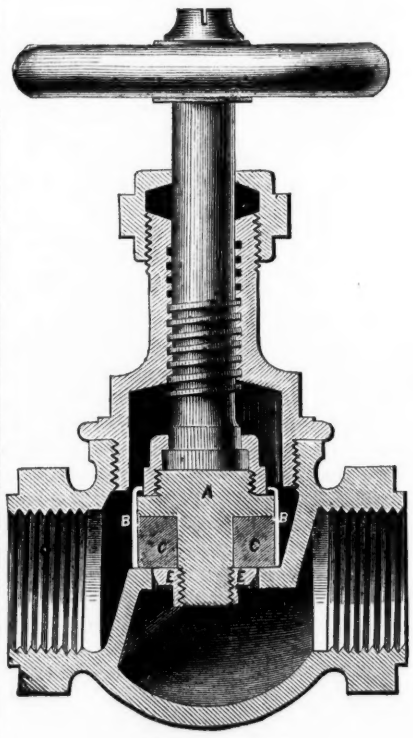
We also present views of Russell's gate valve and of its several parts. The gate is formed of two pieces, which are tongued and grooved together upon an angle. The gate faces are parallel planes, which are made to approach or recede from each other as they slide back and forth. The gate pieces have recesses formed upon their inner opposed faces, to admit the valve stem and loosely engage the collar. In closing down the valve stem, the disks are driven in opposite directions, and forced against their respective seats by a rib or fulcrum. There is but little liability to wear, as the gates do not come in contact with the seats until entirely closed.

It is claimed to be the only gate valve that can be repaired without being removed from the pipe. It has a clear open passage the full size of the pipe. The closing and opening motion being lateral, it is not liable to cut or grind the disk in seating itself, which is a common fault in other straightway or gate valves.

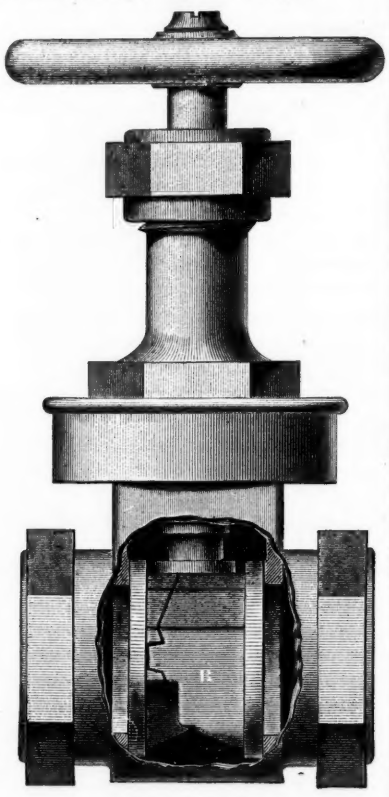
Each part of the valve is made in duplicate, and can easily be interchanged. The disks are uniformly made, and when worn out, can be replaced in a very few minutes.

In other valves no provision is made for the removal of any part, or for repairing a section when it has given out.

These valves are manufactured by McMann & Russell, 56 and 58 Gold St., New York.



STEAM VALVE.


GATE VALVE.

Use of Lubricants.

No. II.

BY L. F. LYNE, M. E.

In my first article on the above subject, I mentioned that it was my intention, in a future issue, to discuss the duties of a good lubricant. A good lubricant is one that will distribute itself uniformly between two wearing surfaces, so as to effectually keep them from touching each other. The writer has been surprised, on different occasions, to hear good practical men argue against the foregoing assertion, and in favor of the theory that the surfaces do touch each other. Take for illustration the bearings of a new engine. It is expected that they will heat for a few days after the engine is first started. Why? Because the bearings being fitted in the usual way, viz.: by filing and scraping there are naturally high spots, or places, where the shaft bears harder than on the other parts, so that when the engine is started the lubricant will distribute itself through the low spots, leaving the prominent points barely covered, and in some cases they actually touch each other, in which case they will become very troublesome.

It is impossible for a bearing to run cool until these high places are reduced so that there will be a uniform film of unguent between the two surfaces. It is a custom for purchasing agents, and in some cases for practical men, when ordering oil to mention simply "lubricating oil," without specifying the kind of bearings for which it is to be used. The latter is a very essential point. Frequently, when the oil is received, it is found to give poor satisfaction, and some of the bearings are found to run hot. Under these circumstances the oil is generally charged with the fault, when, in reality, the fault has been in giving the order. A good lubricant for small, close-fitting, fast-running bearings must be of a very fine quality, and have a light body in order to distribute itself between the close-fitting surfaces. Such a lubricant is entirely unfit for large bearings, where more body is required to carry the heavy weight which is placed upon them. It is the practice in most shops to use the same kind of lubricating oil for all the machinery, which, when properly considered, is both unreasonable and extravagant, for the reason that a bearing when imperfectly lubricated is worn away much faster than it would otherwise be, and on fine machinery the lost motion in the bearings requires frequent attention. The reader will, no doubt, get the idea from the foregoing that several kinds of oil should be used, which is correct, and will probably give rise to the argument that it is too much trouble. In reply I would say that it depends entirely upon the system by which it is used. If the shafting requires oiling every day by using an oil can, I will admit the argument, but my claim is that self-oiling boxes ought to be used on all lines of shafting, supplied with the best sperm oil. Most proprietors will lift their hands in horror and exclaim: "Where is your economy in such measures? Why, we would go into bankruptcy if we were to buy sperm oil."

But, my friends, allow me to say that such bearings, when properly packed, require oiling but once a year, and not a drop of oil is to be seen, either on the hangers, or on the floor; besides entirely avoiding the nuisance of having drip-pans to catch the oil. To prove that the previous assertion is reliable, I will simply refer to the shops of the Brown & Sharpe Manufacturing Co., of Providence, R. I., where such a system is in use, and the bearings are attended to but once a year. Then the oil is taken out, strained, and put back, and a little more added. Their bearings are so constructed as to entirely exclude the dust, thereby greatly saving the bearings from unnecessary wear, and with this arrangement the users can afford to buy the best oil. There are numerous other systems which might be described, but believing the instance mentioned to be sufficient we leave the reader to judge which is the "true economy."

It is impossible to make one lubricant which will answer for all purposes, therefore it should first be ascertained what kind of lubricant will work the best, and settle upon it, and make no changes, which are expensive at all times, and great risk is incurred.

Re-compression as a Factor in Economy.

Editor American Machinist:

In your issue of Oct. 4th, Mr. Hague, in an article entitled Piston Speed and Steam Compression, places himself on record as a compressionist; and makes the assertion that "those who oppose compression broadly, do not know what it is for," etc., citing the case of an engine builder, who "could not, or would not," tell why he built his engines without compression adjustment.

Does it not occur to Mr. Hague that he places himself in the same category as the engine builder?

He does not, or perhaps cannot, tell why he enrolls himself as a compressionist.

As for the assertion, that those who oppose compression broadly, do not know what it is for, I think he is, perhaps, half right.

I, for one, oppose it broadly; and although I have given the subject considerable study, I cannot, for the life of me, make out what it is for.

Will the gentleman please enlighten me?

The adherents of re-compression seem to base their arguments on the hypothesis, that the reciprocating parts are moving in space, and that they are under the influence of an accelerating force, disregarding, utterly, those forces which tend to retard their movements.

The whole argument, thus far, for re-compression, might be reduced to a seeming paradox.

That energy passing through friction becomes power; and power passing through friction, again becomes energy.

Or it might better be represented by the equations e—f=p, and conversely p—f=e.

It will be seen, however, from the equations that the friction f exacts its value from both energy e, and power p.

Energy *can* generate power, but power *cannot* re-generate energy, except at the expense of power.

This is a law of Physics, so his is irrefragible.

It is a fundamental principle of mechanics which is exemplified daily, and one which no amount of theory or sophistry, however specious or plausible, can controvert.

When the conditions of this law can be overcome, then will perpetual motion become an established fact. Then, and not till then, will liberal re-compression be conducive to economy.

Thus, the hypothesis that re-compression is a spring giving back power, equally as the power absorbed, is a fallacy beyond question.

That more power is absorbed in elevating partially expanded steam to the condition of energy than can be again imparted by it, is, to the logical mind, undoubted.

If power, or energy, were thus *sui generis*, even in a small degree, why could it not be made so on a grand scale, and automatic, double-acting compound pressers and squeezers be invented, and applied to the steam engine to utilize the whole volume of exhaust steam, and by "recuperating its drooping energies," enhance the economic action materially?

The man who would transfuse blood from the veins of a young and spirited horse into those of an animal dying from old age, with the impression that by so doing he could not only derive the full benefit of the power of the younger horse, but could increase and utilize the remaining energies of the older animal, would be convicted of idiocy in the first degree, by any intelligent jury in the land.

He would find that it would take a large portion of the remaining energies of both animals to overcome the effects of the operation.

Thus, is re-compression but an attempt to utilize the dead and dying at the expense of the living; in short, a sort of a resurrection doctrine.

If re-compression be a factor in economy, then condensation must be a fallacy, and detrimental to the interests of economy.

Re-compression and partial vacuum are very naturally abhorrent to each other, being directly opposite in their tendencies, and it is utterly impossible to reconcile their differences, so as to place them on anything like amicable terms.

Now, the question naturally arises, Is condensation a factor in economy?

It is argued that re-compression is beneficial in elevating the temperature of the cylinder to such a degree that it will detract little, or nothing, in the way of heat, from the incoming steam.

In order to support this theorem, it must be assumed that the walls of the cylinder are of so susceptible a nature as to be influenced materially—in fact, degree for degree—by very rapid changes in temperature.

Conceding, for the sake of argument, that these rapid changes, and concomitant expansion and contraction, do actually occur, what is the practical use of expending power for the purpose of re-compressing partially expanded steam to a condition of heat and energy, sufficient to elevate the temperature of the clearance space—for that is all that can be materially affected—to such a degree, when, at the next instant, and, thereafter, throughout the remainder of the stroke, the steam is exposed to portions of the cylinder, from which the heat has been feloniously, and with malicious intent, abstracted, in large quantities, by the exhaust, whose kleptomaniacal propensities command so large a share of attention from the resurrectionists?

D. F. NISBET.

Syracuse, N. Y., Oct, 13th, '79.

Safes and Safe Breaking.

BY PARK BENJAMIN, PH.D.

There is a widespread, though mistaken notion, that almost any iron chest with thick walls and an imposing lock is a "safe," and, consequently, that it is an efficient protection for valuables, not only against the effects of fire, but also against the attacks of burglars. If, however, the owner's knowledge extends to the fact that fire-proof and burglar-proof safes are entirely different affairs, it is apt to remain secure in the representation, confidently put forth by every safe maker, that *his* particular burglar-proof construction will baffle the most skillful "cracksman." The error, in either case, is usually discovered after a robbery, and, as in the case of the Manhattan Savings Bank affair, too often at the cost of that part of the community least able to bear the consequences.

Fire-proof safes are not intended as safe guards against burglary, unless, as is often the case, they contain a specially constructed burglar-proof box. Any skilled burglar can open the best fire-proof safe in half an hour, or even in a less time, with his ordinary tools. The massive walls are built strong, to resist falls from the upper stories of high buildings—and their strength lies in the frame only, the rest being boiler iron, filled in with some material, such as cement, alum or plaster, which is both a non-conductor of heat and contains water, which, at high temperature, vaporizes and becomes steam. There are few safes in the market which do not meet all demands in protecting their contents from fire, but the skilled professional burglar knows so well that he can, with little trouble, break open their sides, or wrench out the door, that he assumes, as a matter of course, that no one will be foolish enough to entrust

valuables to so flimsy a safeguard. Hence, he leaves to tyros in rascality the task of rifling fire-proof safes in the blind hope of finding convertible securities or cash.

The problem involved in burglar-proof construction is, to build a solid wall of metal, which cannot be pierced by mechanical means within any period of time at the disposal of a burglar. No safe maker pretends to assert that his safe cannot be entered with proper tools, and in course of time. "What man can construct man can destroy" is a maxim which he does not deny. He reasonably supposes, however, that a safe will not be left unguarded for any longer interval than from Saturday afternoon until Monday morning, and, in the forty hours or so intervening, he claims that no burglar can effect an entrance into it. He takes it also for granted that no tools driven by steam power will be used against his work, and that the safe will be so situated as to make the available room in which a burglar might operate as small and as inconvenient as possible. Such precautions as guards, when the safe is to be left for a long time, its disposition as above indicated, and the maintenance of a light near it, will suggest themselves so readily to any one, that their omission can scarcely be regarded otherwise than as culpable negligence.

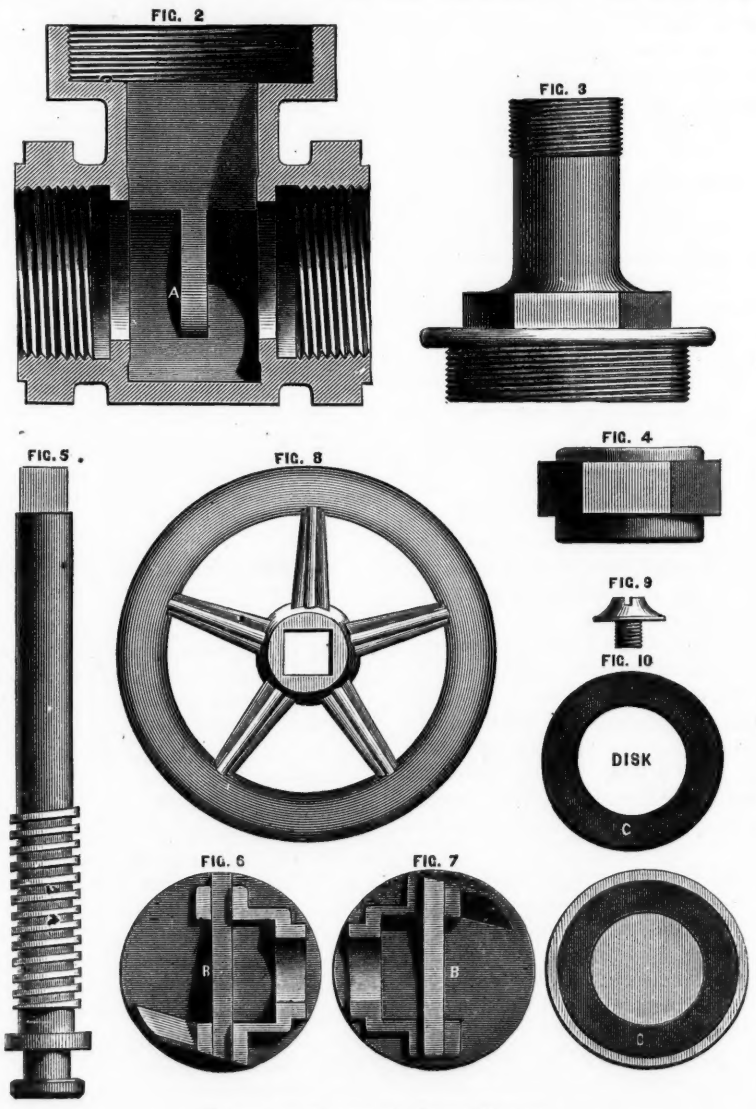
So far as picking the lock is concerned, the wonderfully ingenious construction of modern fastenings renders this undertaking almost certain to fail. The modern burglar seldom attempts it, and the safe builder feels secure as to that part of his work. The assertion is not hazarded that even the best of time locks cannot be opened, but to do so certainly would require extraordinary skill and a very long time. There is no keyhole, wherein to insert powder, and thus blow up the lock, and the shoulders made on the spindles of the knobs, which abut against the solid walls of the safe, effectually prevent the driving inward of these portions. Even such heroic expedients as eliciting combinations by a revolver held to the janitor's head, or a grilling of the cashier's feet, become disagreeably useless when the secret is known to two persons, neither of whom can use his knowledge without the aid of the other. The professional burglar, therefore, avoids the lock, and bestows his attention on the door and walls. And here his nefarious ingenuity grapples with the honest skill of the builder and inventor.

It is admitted by all makers that the perforation of a safe with a small hole, even if not more than half an inch in diameter, places it at the mercy of the thief. He has only to insert a cartridge of dynamite or other powerful explosive, capable of yielding a volume of gas of about double the cubical contents of the safe, ignite the same by a fuse, and the door is torn from its bolts, or the bolts themselves give way. Even if the door is not blown clear off the safe, a few wrenches with the iron bar or jimmy completes the job.

Drilling the safe wall, although the most common mode of attack, is usually not tried until the possibility of easier means is negatived. The burglar will attempt to rip the door off bodily, and without the aid of explosives. Here he meets the skill of the maker in nice fitting. If the door does not fit in its place with an absolutely tight joint, a thin steel wedge is inserted in the crack. The latter thus slightly expanded admits a larger wedge; then another wedge still larger is inserted, and finally an opening is made of sufficient size to enable the jimmy to be put in. The jimmy is simply a bar of finely tempered steel, having a bent and flattened end. It can be lengthened by screwing on sections, and, with the powerful leverage gained, a door is often easily torn from its place, despite its bolts.

If the original crack is of fair size, resort is had to a still shorter process. With soft putty, the joint is carefully stopped entirely around the door, except for a space four or five inches above, and the same beneath. Over the upper orifice thus left, a tin box is placed, the flanged edges of which are closely puttied to the safe. Leading from this box is a rubber tube which connects with a small portable air pump. While one burglar works the pump, and so exhausts the air from within the safe, a second holds a card edgewise to the lower crack, and slowly sprinkles fine mealed powder therein. The powder is at once drawn in and distributed between the door and the body of the safe It simply remains to ignite the explosive and the door is either torn off, or so far sprung outward as to allow the jimmy to enter. Ingenious tongues on the door, dove-tail arrangements of the flanges, and a rubber packed front, now found in the best safes, frustrate such efforts as that last described, and the burglar is now restricted to drilling the safe, or tearing it apart, and in its successful opposition to such attacks as these lies the efficacy of the system of construction.

Although the expression "solid wall" has been used in referring to burglar-proof safes, in contradistinction to those especially fire-proof, it is not to be understood that safe walls are masses of homogeneous metal—some safes, it is true, are so made. One maker casts iron directly around a basket work of the



PARTS OF RUSSELL'S GATE VALVE.

wrought metal. Another makes a safe of solid Franklinite—a peculiar variety of iron to which particular reference is made further on; and other examples might be given. Such large metal castings, however, are apt to be defective; they are costly to produce; and the safes so made are generally of limited capacity. Special advantages are claimed for this mode of construction over "built up" safes; but, at least in the light of the experiments quoted elsewhere in this article, it is doubtful if they are so great as is asserted.

All prominent safe builders build their safes of combinations of iron and steel, the differences lying in the nature of the materials, and modes of uniting them. The frame, for example, may be of heavy welded hoops or solid angle iron. The plates attached to this frame may be of steel, wrought iron, or case-hardened cast iron. Different grades of steel may be welded together, or steel and wrought iron may thus be combined. Quite a variety of modes of fastening plates, or sets of plates together, exists. One maker rivets adjacent plates; another joins several plates at once, by conical bolts; another uses heavy screws, and so on. In all cases there is much ingenuity expended, for the connecting pieces must be so made, and put in, that the burglar cannot pull them out; and care is even taken to make them of the same material as the layers through which they pass, so that their location cannot be discovered by the difference of the sound emitted on striking them, as compared with that given forth by the main portion of the safe. In the manner thus outlined, hard metals are used to prevent drilling, and strong fastenings to prevent tearing asunder of the plates.

As a rule, the tests to which sample safe sections are subjected, when submitted to bank officers, amount to nothing. The committee charged with buying the safe, usually entrusts the trials to the first engineer or mechanic that is suggested, without any regard as to whether he is skilled in manipulating abnormally hard metal, or is at all conversant with its properties. He tries a few ordinary drills, smashes them, as might be expected, and reports the metal impregnable; or else drives at the section with steam punches or other power tools, which it was never intended to resist, and reports a failure. The writer has seen sundry certificates from such "experts," which indicate the densest ignorance relative to the questions they were called upon to decide; and yet on these same certificates costly safes have been purchased.

The writer was recently instructed, by a well known safe-building firm of this city, to submit their safe to the most severe tests that could be desired—entire liberty being given him to fix the nature of the trials—the only stipulations made, being that the total time of actual attack on the safe should not exceed 24 hours, and that only such tools as might easily be carried by two or three burglars should be used. The writer associated with him, Mr. Richard H. Buel, C. E., and under the immediate personal supervision of that gentleman the trials were conducted.

The system of burglar-proof construction, tested substantially, in common with that of other makers, consists of layers of high and low steel and iron; but it differs materially from all other combinations in its embodying a layer of Franklinite iron. This iron is obtained from an exceedingly hard mineral, composed of peroxide of iron, oxide of zinc, and oxide of manganese, and found in Sussex Co., New Jersey. It is hard enough to cut glass, which it resembles in many of its properties, crystallizes beautifully, and in safe construction is cast around a grating of wrought iron rods. The representative plate on which the tests were made consisted of layers in thickness as follows:—hard and soft steel, welded together, 2.6 inches; Franklinite 2.1 inches, and finally a lining of soft iron, 0.42 inch—the total thicknesss being 5.12 inches.

It was recognized that, in a large number of trials previously made on this safe, the pressure applied to the drills had rarely exceeded 2,000 pounds. It was therefore determined to use the greatest pressure the drills would stand, or rather the maximum pressure which two strong men could apply to the feed of a drill-press, in which the tools were held. The drills, made of steel hard enough to cut glass, soon penetrated, with a hole 1½ inches in diameter, the outer layer of soft steel; but broke when the following stratum of hard steel was reached. Recourse was then had to the flame of the compound blow-pipe to "draw the temper," and so soften the metal, and with this help and new drills, progress inward was resumed. Some nine hours was occupied in piercing the steel, the tremendous heat of the blow-pipe being in constant use. Then the Franklinite was touched, and again the drills flew to pieces. The tug of war had begun. Drill after drill broke. The first impression on the intensely hard metal was made under a pressure of two tons, and this was increased at times to *six tons*. The drills refusing to cut, simply ground their way onward—screeching loudly enough to arouse the most somnolent watchman, for to use oil was impossible. It was simply the abrasion of metal on metal, and a question of which would wear away hard steel or Franklinite.

The men at the lever became tired and reliefs were supplied, and thus the work continued. Finally, after eight attempts, lasting from three to five hours each on consecutive days, and aggregating in all twenty-six hours actual working time, the effort was abandoned. The outer steel layer had been pierced, but over a quarter of an inch of Franklinite and the iron behind it was intact. Yet 125 of the best drills that could be procured, specially made for the work, had been destroyed, and the stipulated time exceeded by two hours' actual drilling and by over six hours of total labor on the sample.

It is hardly necessary to point out that this test was far more severe than any attack which a burglar could have made, under the most favorable circumstances. No two or three men could have worked the drill lever continuously for twenty-four hours, nor would it be probable that they would have any such facilities for manipulating the work as here existed.

While this trial establishes the fact that the Franklinite layer in Herring's safe cannot, probably, be entered by any means at a burglar's disposal, it leaves the impregnability of forms of other safes still to be definitely proved. The writer believes that combinations of hard steel with soft steel and iron doubtless exist, or may be made, which will stop the drill; that some manufacturers assert as much he is perfectly well aware.

The above test may serve another purpose in indicating how crucial a simple experiment of this sort may be made, and thus may suggest to officials of moneyed institutions to what extent they may easily assure themselves relative to the pretensions of rival safe makers, and the value of the safeguards to which they entrust the great wealth committed to their care. It is entirely within the power of any corporation or concern, purchasing an expensive safe or vault door, to insist on competitors submitting their samples to as severe a trial as may be desired before considering any claims. Such a course would promptly eliminate cheap and inferior safes, for their makers are intensely averse to experiments of any sort calculated to show up their wares; while the honestly built safes would be judged strictly according to relative merit and, with regard to their special adaptability to the purposes for which they were required.

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NEW YORK, NOVEMBER 1, 1879.

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A Vital Issue—The Prison Labor Contract System.

The gross injustice of the prison labor contract system, in its results upon free labor, is every day becoming more apparent. We have several times taken occasion to point out, in these columns, the necessity of meeting this growing evil with strong and effective opposition.

At this particular time the question is thrust home to the working mechanics of this country as it never has been before. The Legislatures of New York, Massachusetts, New Jersey, Connecticut, and several other States, each appointed special commissions at their last sessions to investigate the prison labor contract system, and report at the sessions held next winter. Four or five of these commissions have met together, and it is understood that a uniform report will be presented to the several Legislatures. The next step will be to decide the question by a direct vote in each legislative body. Cut and dried politicians, both on the stump and through the press, try to obscure this most vital issue by discussing questions that have already been settled too decisively to give further trouble. The AMERICAN MACHINIST takes no political grounds in favor of, or against any existing party, but to the worker for wages this issue is vastly more important than the success at the polls of any partisan organization. By keeping comparative silence upon this question, the leading political newspapers have lulled the working men into a feeling of fancied security, most of them, probably, holding the view that it is not so much of a weighty question after all.

It is true that the evil effects of convict contract labor are only, as it were, beginning to be felt in this country, but an instance or two will show what may be expected unless the system is completely reformed. It is estimated that there are about 9,000 moulders in this State, and in Sing Sing prison Perry & Co. have nearly 1,000 convicts employed at 40 cents a day in moulding stoves. It is stated that the contractors made half a million dollars out of the prison job last year, and one of our exchanges publishes an item, saying, that they are now so crowded with orders that two hundred free outside moulders have been engaged to assist the convict moulders in the prison. What wages can the other 8000 moulders in this State expect to receive, competing with prisoners at 40 cents a day?

Within the last few weeks we have recorded several stove moulders' strikes, but while such an iniquitous prison system exists they must get along upon low, if not still lower wages. Two thousand hatters are said to be out of employment in Brooklyn alone as a result of prison competition. The saddlery trade has been grievously injured by cheap prison competition, everywhere in this country. In some foreign monarchial countries where this evil has been fostered, and where the working mechanics have very little choice in political or social systems, the effects of prison contract labor can well be studied. We append some brief extracts from a report of United States Consul Stanton, sent to the State Department from Barmen, Germany, last fall. It presents facts that every mechanic should study, and then, before voting ——— *think.*

"The production of locks in Cologne, Werden, and Münster, is so great as to make this article *virtually a monopoly of those prisons.*"

"It is difficult to draw an accurate comparison between the labor of freemen and criminals, but taking a day's wages as a standard, and assuming that a criminal produces half as much as a freeman, although this is a low estimate, since the use of machinery places skilled and unskilled labor nearly on a par, the daily wages of a criminal amount to but 80 or 100 pfennige, or not 50 per cent. of the amount which must be paid to free labor, and the contractor has, moreover, the free use of shops, heat, light, and in some prisons, of steam, in consideration of a small remuneration for coal; while if against this the cost of free labor, together with that of factories, repairs, interest, &c., be placed, it becomes perfectly plain that contractors for prison labor are secure from all competition.

"A proof of this is afforded in the official reports of the Ratibor prison, where, according to which reports, the contractors, having, but a few years ago, introduced the manufacture of hardware, have conquered the markets of Silesia, Prussia, Pomerania, and Saxony. They underbid every competitor, and where free labor enters the lists against them it inevitably succumbs, for prison contractors are in a position to sell much cheaper than they do. If it be opposed that the products of free labor are of much superior quality, this advantage is more than balanced by the cheap prices of prison wares.

"Whilst ordinarily the competition of criminals is bad enough, in times of depression and business stagnation the effect is simply ruinous, for the terms of the contract, forbidding any limitation of the production, contractors, in order to realize, are compelled to throw their goods at any price on the already overstocked markets, which, in the district of Hagen, has resulted in the *utter ruin of many branches of hardware.*

"Again, whilst the prison wares are sufficiently well known at home, and, consequently, less fatal to the reputation of the products of free labor, they have a very different effect in foreign markets. Abroad they are known as German wares, and undermine the good name of that country's products. The best example of this is in the article of chains, which was formerly an important article of export to all transatlantic lands, and which now, in consequence of the competition of the Cologne prison, are scouted in all foreign markets.

"The necessity for employing criminals is duly admitted, but the system at present in vogue is injurious to the community. It is thought it would be better were the prisoners employed in the manufacture of articles for their own needs, or that such work only should be done in prisons as could not conflict with mercantile enterprise, such as what is needed for the prisons, province or community, or in the partial manufacture of articles which, before entering into consumption, should be finished by free labor. It is also suggested that the criminals be employed on public works, such as highways, canals, fortifications, &c.

"It is also believed that a systematic grouping of the prisons, after the performance of certain work, and the assignment of the criminal to the prison his trade most fits him for, would soon enable the prisons to manufacture every article needed by them."

The Education Young Men Need.

In times like the present, when able and skillful mechanics are carefully sought for and offered good wages, it is, to many philanthropic people, a matter of wonder that so many educated (?) individuals are seeking employment at anything that will afford them a bare living. The ranks of bookkeepers, salesmen, clerks, collectors and agents remain overcrowded; yet there is an actual scarcity of steady, capable machinists. This scarcity is likely to continue, as, according to our observation, the number entering the ranks of real machinists is very limited. Unless our popular systems of business education are reformed in the interests of productive energy, we may expect a serious decline—not of inventive abilities, but of constructive skill. Manual labor (the source of all material wealth) is held, by many people, to be disrespectable. Youth are taught to consider the trade of a machinist as unclean and far from genteel. They are constantly pointed to examples of enterprising and far-seeing young men, who enter mercantile pursuits and become prominent and wealthy citizens, get elected to the Legislature, or to Congress, and stand forth as shining lights in social circles. But how rarely do we see the youth encouraged by pointing out examples of mechanical success? The model hero of a moral Sunday School library tale is a boy who, beginning life on a farm, studies the sciences, ancient and modern languages, by the light of a tallow candle, when his day's work is done; gets appointed confidential clerk in a dry goods store, rises to be junior partner, and, after the decease of the head of the house, steps into his place, and controls the business. A young man reads these highly moral yarns, studies for years upon dead languages, and other "liberal" branches of an education, finally drifts into a cheap clerkship (as he is not fitted for anything better), and ekes out a precarious existence upon the scanty pay he is able to secure while waiting, Micawber-like, "for something to turn up" that will "give him a start in the world." This city is surfeited with so-called "educated" men, who, out of employment a large part of the time, are ready to seize upon the position of waiter in a restaurant, night watchman in a hotel, or some other equally valuable situation, as soon as offered.

These men, as a rule, were in youth thoroughly impressed with the belief that manual labor is beneath the dignity of "educated" men. Hard experience after a while convinces them that they were sorely mistaken. How fares it with men who, unawed by the respectability of clerical work, devoted their years of study to learning a live mechanical trade? If they spent their time well in acquiring it, desirable positions seek them rather than make it necessary to spend much time in searching for the positions. They command good wages, and are enabled to save something to start business on their own account. As to the respectability of working mechanics, a little thought, well directed, will force a conclusion at variance with the notions often implanted in the minds of ambitious boys. To carry forward the greatest works of national and social progress, the need is felt of—what? More expert bookkeepers, clerks, and salesmen? No; but of more expert mechanics. It is to them that we must look for leaders in material advancement, and for skill to carry out the noblest achievements for the benefit of mankind. They are respected because they command respect, and no falsely founded sentiments as to the inferiority of manual labor can prevent it. Original, thinking and pushing mechanics will assuredly take higher rank than soft-handed accountants, and soft-headed clerks.

No friend of the AMERICAN MACHINIST need be deterred from calling on us by the small but active automatic *bear*, which an ingenious model maker, located in the same building, has placed in a glass case at the entrance, 96 Fulton Street. The animal is only dangerous to such individuals as the sham legislators, who sustain the unjust and impolitic Prison Labor Contract System, which still hangs, as a dead weight, upon the advancing prosperity of the country.

We call especial attention to an article on our first page by F. G. Woodward, of Worcester, Mass., entitled "How to Adjust Shafting." It is a practical subject and is treated in a practical way by the writer, who has had ample experience. It will readily be understood by aid of the diagrams.

In its issue, September 1st, the *Cincinnati Artisan* did us the honor of copying the article, published in the AMERICAN MACHINIST of August 9th, entitled "Oil Stones and their Uses," by L. F. Lyne, M. E., but (inadvertently, of course,) omitted to give the proper credit. As a result of this omission, the *Metal Worker*, published in this city, copied the article in full in its issue of Sept. 27th, and credited it to our Cincinnati neighbor.

Now, as the article in question is of considerable practical value, and, together with the drawings, was prepared expressly for the columns of this paper, at some trouble and expense, we would suggest to our contemporaries the propriety of noting the omission.

Western Ramblings.

Those Eastern machine tool makers who imagine, so far as manufacturing purposes are concerned, that Indians still roam at large in Western cities, will be surprised, on visiting Cleveland, Hamilton or Cincinnati, for instance, to find that there are machine tool makers in those busy commercial centers, who may safely be trusted to cut a creditable figure in the scramble for lucre and laurels.

Shops in the West are quite generally built on the piecemeal plan. As the business grows, an addition is tacked on upon one side, or at one corner, and work goes on, but at some disadvantage, usually, in the small but weighty details of economical handling. But already one or two of the larger shops

begin to show symptoms of methodical neatness and organized arrangement, which would do credit to the fathers of the trade. Obviously, the Indian lingers no longer, except in front of cigar stores.

The conditions of Western shop growth, naturally enough, reproduce themselves in the various phases of the skilled labor question. In Providence, or Hartford, or Philadelphia, skilled workmen can usually be had at a few hours' notice. Similarly, this is true in the larger Western cities, but not quite to the same degree. In the smaller centers, skilled workmen have more generally to be imported, when wanted speedily. In some places, as, for example, Dayton and Springfield, Ohio, demand and supply varies with the season and the wants of the agricultural implement market.

Singular, is it not, how greatly, to the utilitarian mind, the smoke rising from a forest of tall chimneys in a manufacturing town or city, adds beauty to the landscape and symmetry to every street and suburb? Then places that appear bleak enough, when the furnaces are fireless, and the wheels are whizzing no longer, and the drills and planers are still, take on a new and positive beauty that did not exist before. And it is employment, and wage-earning, and wage-spending, and the gladdening of workmen's hearts and hearthstones, that work the miracle. All over the West, just this kind of beauty may now be seen upon every hand.

Everywhere in the West we found a marked curiosity to know who "Chordal" is, where he lives, etc., and it was sometimes difficult to avoid answering the direct interrogatory. "Chordal" having begun his dissection of the Cincinnati Exposition, we were almost tempted to bask under assumed honors and masquerade in his name at that creditable show, but the fate of Ananias and the Tichborne claimant came up as a warning, and virtue resumed her sway.

Elsewhere, as to "Chordal" there were narrow escapes. Happening, upon one occasion to mention having recently seen that astute mechanical critic, and, mindful of his parting request not to "give away" his identity to strangers, we were taken quite unawares by one persistent questioner, who, with spectacles on nose, placed his finger on a large map hanging near by, and blandly inquired: "Ah! What place did you say that was?"

But a little comparison, and some observation since, has shown that this was an old expedient, and that the geographical analyzer is by no means a creation of modern times. We are persuaded that years after the ark subsided upon the rugged peak of Ararat, and the Noachian patriarchs had begun to relate the history of that dangerous landing, on summer evenings in the corner grocery, there was not wanting the spectacled skeptic, or seeker after knowledge, as the case may be, who similarly intoned: "Ah! lemme-see—What place did you say that was?"

In the West, as in the East, pattern making is becoming more and more a distinct business. In Cleveland, we heard of one pattern shop whose proprietor at one time employed 10 men, but, thinking he had made money enough, he concluded to give up his business and buy a farm. Three or four years of bucolic experience, and the sinking of a large share of his capital, satisfied the would-be farmer, and he returned to pattern-making not quite so well-to-do in the world, but wiser.

Moral—Every man, from pattern-maker down to politician, should stick to his trade.

There, as well as elsewhere, it is a mooted question, whether sending pattern work to a jobbing shop to be done is more, or less economical to a machinery manufacturer, than doing the work upon his own premises by hired employés. Instances are mentioned showing a great saving in the former method, but some employers think new ideas safer when worked out by their own draughtsmen in their own shops. Very frequently special circumstances decide the course to be pursued.

A marked feature of Western machinery business is the supply of mining machinery for the distant territories and Pacific States. Many large shops depend almost wholly upon this source of demand for their business. Obviously this is a field in which civil and mechanical engineering, emulating the lion and lamb in the fable, may lie down together. But which lies down inside of the other we are unadvised.

In Cincinnati, though a prominent manufacturing center, notably in the line of wood and iron working machinery, with Hamilton, Springfield and Dayton as outlying suburbs, the department of machinists' supplies does not seem to be pushed as aggressively as in some other Western cities. Importing an ambitious Yankee or two in that business might be a good investment for the smoky city of the Ohio valley.

Elsewhere we have noted the marked interest shown in the West in the revival of the apprentice system, as a means of supplying the now universally prevalent need of thoroughly skilled workmen. While the details of the plan, as outlined, may be, and, indeed, are, open to criticism, the intention is good, and deserves all praise. But the effectual critic is the boy himself, before he becomes an apprentice, either out of his own head, or through his parent or next friend.

Who Profit by Poor Patents?

In its issue of September 15, the *Western Manufacturer*, after a rather lengthy incubation, copies, in full, an editorial article, entitled; "Useless Inventions," which appeared in the AMERICAN MACHINIST of July 19, and proceeds to comment upon it in the following fashion (the italics being our own):

"USELESS INVENTIONS."

Under the above heading, the *American Mechanic* indulges in an essay on that passion for invention that seems to take possession of many minds which seem to lack the practical tact that distinguishes between the useful and the merely novel. Novelty is, by no means, synonymous with value, and methods are not necessarily of practical utility simply because they are new. *It is true that thousands of applications are made that never go beyond the office, and there are many others allowed, which prove to be of no practical value. In either of those cases, the inventor, or the would-be inventor, are the only sufferers.* The public at large is not affected one way or the other by the issuance of a worthless patent. We are disposed to think the writer referred to is a little too sweeping in his charge that "patent agents and solicitors, whom these myriad inventors are daily consulting," never advise as to the value or worthlessness of an invention. We know of many instances in which the would-be patentee has abandoned his invention on the advice of a conscientious and faithful attorney; and, in our experience, that is not an uncommon thing. The following is the article referred to: etc.

Now, as to the "experience" of the *W. M.* (and, as its publishers are patent solicitors, they are presumed to have some experience), have no means of knowing how far it may be relied upon in determining the total number of *patentable* inventions, which have remained unpatented in this country on the advice of patent agents; but we infer that it will not prove to be alarmingly large, as the statistics show 218,000 U. S. patents, and any one can venture a guess as to the proportion of these which possess any real utility. As to the effect upon the public at large of issuing such a flood of worthless patents, certainly the whole patent system is degraded thereby, and the interests of real inventors must suffer.

Practically, the italicized portions of our Western critic's remarks give away his case, and admit the soundness of our views throughout. In fact, the whole criticism bears indications of having received, in its preparation, about the same degree of care and thought, as was shown in stating the name of the paper from which its extract was taken.

Machine Shop Wages.

Following are rates of wages in Chicago and Milwaukee, obtained personally during a recent visit to the West. It will be seen that the apprentice question is receiving a favorable degree of attention in both these cities.

Gates & Scoville Iron Works (Engines, Quartz Crushers), 52 Canal street, Chicago, Ill., pay machinists, pattern makers, and moulders, $2.25 to $3 per day; blacksmiths, $2 to $3.

Geo. M. Scott (Blacksmiths' Bellows), Chicago, Ill., pays wood-working machine hands $1.50 to $2 per day.

Fraser & Chalmers (Engines and Mining Machinery), Chicago, Ill., pay machinists an average of $2.50 to $3.50 per day; blacksmiths, $2 to $4; pattern makers, $3 per day. This firm take the sons of their workmen as apprentices at weekly wages of $4, $5, $6, and $7, for the first four years, and afterward according to their value. They now have 7 or 8 apprentices who are taught (or enabled to learn) all branches of the business.

Chicago Die and Machine Works (James Hogg), 89 and 91 West Lake St., Chicago, Ill., pay machinists an average of $2.25 to $3 per day; die makers, $2.75 to $3.

King & Andrews (Foundry), Cor. Fulton and Union Sts., Chicago, Ill., pay floor moulders an average of $2.25 to $2.35 per day; helpers, $1.25; cupola helpers, $1.50 per day.

C. E. Roberts & Co. (Machine Screws), 22 and 24 S. Jefferson St., Chicago, Ill., pay machinists an average of $2 to $3.50 per day.

The Adams and Westlake Mfg. Co., 11 and 13 Fifth Ave., Chicago, Ill., pay die makers an average of $2.75 to $3.25 per day; tinsmiths, $1.50 to $2.75; brass finishers, $1.50 to $2.75; metal spinners, $1.75 to $3 per day. Lantern makers and japanners are employed usually on piece work.

Crane Bros. Mfg. Co., Chicago, Ill., employ about 40 to 50 machinists, who receive an average of $2 to $2.75 per day. Moulders receive the same rates; blacksmiths, $2.50 to $3; pattern makers, $2.50 to $2.75 per day. This firm have about one apprentice for every five men. The boys are taken on 4 years' time, and receive $4, $5, $6 and $9, respectively, per week, during each year, and have opportunity to learn all branches of the trade. Those who are worthy are given a letter of recommendation by the firm to the principals of the free schools, and such technical schools as may be available.

Norton Bros. (Tinware Manufacturers), 40 to 46 River St., Chicago, Ill., employ four or five machinists and one apprentice, the former receiving $2.50 to $4.50 per day. This firm employ about 200 hands in the manufacture of their various specialties, and pay tinners $1.50 to $3.50 per day.

R. Davis (Marine Boiler Works), Oregon St., Milwaukee, Wis., pays boiler makers an average of $2 to $3.10 per day; blacksmiths, $2.25; helpers, $1.25 to $1.75 per day.

Hoffman, Billings & Co. (Brass and Iron goods), 141 to 147 W. Water St., Milwaukee, Wis., pay machinists an average of $15 to $21 per week; brass finishers, $14 to $24; floor moulders, $12 to $21; brass moulders, $21; pattern makers, $18; steam fitters, $12 to $18 per week. In all departments, this firm employ about 20 apprentices, who begin work, first, in the brass foundry, and are then, after a suitable preparation, transferred to the brass finishing shop, where they are employed on such work as finishing valves, &c., at the lathe. Later, they are transferred to the machine shop, with full opportunity to go the entire rounds. The boys receive from $1 to $2 per week the first year; $2 to $4, the second; and $4 to $6, the third, with a little present each Christmas, and an outfit of $25 in money, or a set of tools, as may be preferred, on the expiration of their time. This firm are building a new machine shop, 37x120 feet, 3 stories high, and expect to buy new machinery and tools, including a large lathe and drill press.

Thos. M. Corbett & Co. (Engines, &c.), 135 and 137 Ferry St., Milwaukee, Wis., pay machinists an average of $2 to $2.25 per day. They have 3 apprentices, who are taught all branches.

The Milwaukee Steam Engine Works (Weisel & Vilter), 76 and 78 Chicago St., Milwaukee, Wis., pay machinists an average of $2 to $3 per day. Blacksmiths receive the same rate; pattern makers, $2 to $2.50 per day.

Edward P. Allis & Co., Reliance Works (Engine builders, Mill furnishers, &c.), Milwaukee, Wis., employ, in all departments, about 675 hands. Machinists receive an average of $1.75 to $2.75 per day; floor moulders, $2 to $3; blacksmiths, $2.25 to $3; blacksmiths' helpers, $1.25; pattern makers, $2.25 to $2.62; millwrights, $2 to $2.50 per day. The wages of pattern makers are to be advanced about 7 per cent. The firm have 8 or 10 apprentices on 4 years' time, who have opportunity to learn all branches. Steam engines embrace about one-fourth of their business.

Business Specials.

Forty cents a line for each insertion under this head.

The Huntoon Steam Governor Co., of Lawrence, Mass., warrant a direct saving in steam of from 10 to 20 per cent. over any other Governor known; while for quick and accurate regulation, great durability and lasting economy in use, they guarantee results never before attained by any other. See advertisement.

Brown & Sharpe M'f'g Co., Providence, R. I., keep in stock at reduced prices Patent Cutters for the teeth of gears which can be sharpened by grinding without changing their form. All wheels of same pitch cut with them will run together correctly. Send for new catalogue.

Steel Stamping Letters, Figures, and Dies, 1-16 to ¼ Figures, per set, $3.00; ⅜ Figures, $1.00. American Tool Co. Cleveland, O.

Tool Chests with best tools, scroll saws, wood and designs. Amateurs' and Machinists' Tools. Send for Catalogue. Tallman & McFadden, Philadelphia.

Questions and Answers.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly and according to common sense methods.

(1) R. R., Irwin Station, Pa., writes: I had a 3″ cylinder cast, and on boring it out and turning the flanges I find quite a number of holes in one side of the bore. Would you please inform me through your paper the best way to fill them? I have turned the flanges and would like to polish them, providing the holes can be filled with some material that will have the appearance of the finished iron when done. A. We would say that it is generally the wisest course to pursue when a cylinder casting is found to be "honey-combed," or unsound, to throw it away, for the reason that it is liable to become leaky at any time. But in some cases where the holes appear on the flange they may be plugged with the same material of which the cylinder is composed, and, when properly fitted and finished, will not be noticed. Any other metal will show.

(2) W. B. G., Reading, Pa., requests: Please inform me what issue of your paper gives full description, with illustrations, of an Indicator? I have been reading your paper for some months, and can get no very good ideas of the cards, etc., as I have never had an Indicator explained to me. A. A description of an Indicator was given in the AMERICAN MACHINIST, issued June, 1878, also an illustrated description of the same in August, 1878. For description of cards, see "Engineering Popularized," by Wm. Lee Church, in the AMERICAN MACHINIST. For dates, see index to articles on the 12th page of the same.

(3) J. Y., Accrington, England, writes: Would you kindly say in your correspondents' column if you have in America any suspension bridges for railway work? If so, the names and spans, also if wire or chains, or chain bars are used. A. The first successful railway suspension bridge erected in America was the one over the Niagara river. The present structure was built by J. Roebling. Length of span, 821 ft.; deflection, 59 ft.; number of wires employed in the four cables, 14,560; ultimate strength of the same, 12,000 tons; elevation above water, 245 ft. Has a single track over which the heaviest trains are constantly running, and the bridge is so stiff that when the trains pass over it they cause a deflection of about 3″ to 4″. Was built in 1855. Is a complete success. Others have been built since. The lattice girder pattern is extensively used, and since 1860 many patterns have been introduced. One of this class, built by Albert Fink, is located across the Ohio river at Louisville. Length, 5,218⅔ ft.; spans, 25; piers, 24; height above low water, 96½ ft.; width, 27 ft. There are numerous bridges of this class. A remarkable steel truss bridge, used for railway and road, is located over the Mississippi river at St. Louis, Mo., designed by J. B. Eads; begun in 1869. There are four piers, the foundations of which extend 120 ft. deep in one case. One span is 520 ft. ong, and two 515 ft. each over the water-way. Rise

of arches, 60 ft. The foregoing are only specimens, it being impossible to give you a complete list within our limited space.

(4) F. S. B., Tiverton, R. I., writes: I have watched with anxiety, in your paper, for the appearance of a correct method for putting the main shaft of an engine at right angles with the main line of shafting, when the connection is to be made with gears, and the main line in the upper part of the building. A. Drop two plumb lines from the main line of shafting through small holes bored in the floors to the floor upon which the engine is to be located. Care must be observed that the lines do not touch the sides of the holes in the floors through which they pass. Stretch a line just clearing the lower floor, touching the two lines previously mentioned, which will give you the location of the main shaft. Ascertain the location of the engine shaft and stretch another line as nearly as possible at right angles with the main line, using a carpenter's square. From the point where the two lines intersect, which we will call A, set off on the main line (on whichever side that seems the most convenient) three equal parts by any scale, and to be more plain we will say 3 feet, the end of which we will call E. From the same point A, on the line for engine shaft, set off 4 equal parts by the same scale, which equals 4 feet, the end of which we will call C. From E on a line with C set off five equal parts by the same scale, which equals 5 feet. The foregoing measurements should be made with a pair of trammels with very fine points to insure accuracy. From the point A, with the trammels set to the distance from A to C, describe a short arc, and from the point E, with the trammels set to the distance from E to C, describe an arc, cutting the other at C. By shifting the line for the engine shaft so that it will pass through the points A and C it will be at right angles with the main line. In placing the gears allowance must, of course, be made for the main line which is stretched from the side of the shaft, and not the center. In the foregoing description it has been assumed that the writer of the communication knows little or nothing about lining shafting, hence the expressions which may seem superfluous. The best cheap lines to use are called sea grass, or small fish lines. The reader should lay out the proposition described with a pair of dividers, to be sure that he understands it. There are other propositions that might be used, but the foregoing can be used in many places where others cannot.

MANUFACTURES.

On a recent Western trip, business in the various machinery departments was found to be brisk and looking well for the future in every place visited.

In Cleveland, Ohio, there are a number of large establishments building steam engines, and three more or less actively engaged in building machine tools. Of the former, the Cuyahoga Steam Furnace Co. seem to make a specialty of very large work. At the time of our visit, they were casting some steam cylinders of enormous size.

Newton & Cox, of Cleveland, build quite a line of machine tools and twist drills comparing very favorably with the products of Eastern houses. Some of their machinery will be illustrated in an early issue of this paper. Mr. Cox, the junior partner of this firm, is a son of Ex-Governor and Ex-Secretary J. D. Cox, and before attempting to engage in business for himself, went out from a luxurious home, put on his overalls, and faced the dust and grime of the shops for some years while learning the trade, and preparing himself for a square start in life. This is an example that should not be lost on some of our young men, who fancy no business desirable in which there is any fear of getting dust on their clothes or dirt on their noses.

The Enterprise Machine Co., of Cleveland, have just completed a new horse shoe machine, the invention of Mr. Webster Roberts. Forming a company in Cleveland to manufacture horse shoes by this machine is talked of. We should be glad if it were possible to show our readers an illustration of this machine, but a brief description must suffice. The body of the machine (which is claimed to make 40 to 45 horse shoes per minute) is a heavy iron roll, mounted substantially, to which three horse-shoe shaped steel dies are attached. The movements of these dies are regulated by a heavy solid triangle with rounded corners, which is attached to the end of the main roll, and operates as a cam. Ordinary horse-shoe bar iron is heated and shoved into the machine, one bar at a time and is sheared to proper length. Then by the operation of the side or bending plates, the bar is bent to horse-shoe shape, and the blank is pressed, creased and finished by the three revolving dies, operating successively like three blows of a hammer. The shoe is then drawn back by an automatic backward movement of the bending-plates, and drops out finished.

The Stockwell Screw and Machine Co., of Cleveland, have made, for their own use, and are using, a machine for making machine screws, ¼ to 1 inch sizes, that attracted our notice. In this machine 12 pieces of iron are inserted, and the machine operates upon eight; that is, two of the tools are milling, two are pointing, two are threading and two are cutting off, while the remaining four pieces of iron wait their turn. The firm are now making an additional machine of this pattern.

One thousand additional machinists, blacksmiths, etc., will be employed in the new shops of the Lehigh Valley Railroad Company, soon to be built at South Easton, Pa.

Portland Machine Works, Portland, Me., have failed; liabilities, $51,954.

Stuart, Peterson & Co., Philadelphia, announce that they have granted an advance to their stove and hollow ware moulders of ten per cent. over the prices paid thirty days ago.

Machinists' and Engineers' Supplies.

NEW YORK, October 16th, 1879.

The market is active and business is "booming." Prices of iron and steel goods are firm, but rapid advances are neither looked for nor desired, though a further lift in prices is doubtless to be looked for in many goods.

Genuine Chester emery has advanced one cent a pound. Files have an upward tendency. The Black Diamond File Works, of Philadelphia, announce that the discount to the trade on their files has been changed to 30%.

We understand that machine screws have advanced from 10 to 20 per cent.

The Worcester Machine Screw Co. have issued the following announcement:

Worcester, Mass., October 10, 1879.

Gentlemen: Owing to the great advance in the price of materials of all kinds, we are compelled to withdraw all former quotations. All orders on our books at this date will be filled at present prices. Goods ordered hereafter will be invoiced at rates ruling at date of shipment. Yours respectfully,

WORCESTER MACHINE SCREW CO.

James Beggs (formerly of Cooke & Beggs) has just opened a supply depot in commodious warerooms, No. 8 Dey Street, New York, and has issued a circular with the following announcement:

No. 8 Dey Street, New York.

I beg leave to inform my friends and patrons that, having withdrawn from the firm of Cooke & Beggs, I have leased the above premises, No. 8 Dey Street (next door to the Western Union Telegraph Co's Building), where I am prepared to fill orders from stock for every description of Supplies for Machinists, Blacksmiths, Mills, Plantations, Mines, Railroads and Steamships with promptness and correctness, and at Lowest Market Prices. Engines, Boilers and Millwright Work, Pumps and Heaters, Steam, Belt and Hand Elevators, Turning Lathes, Planers, Drill Presses, Milling Machines. Steam Heating and Ventilating. Plans and Specifications for General Machinery.

October 1, 1879. JAMES BEGGS.

Mr. Beggs has also been appointed New York agent for F. C. & A. E. Rowland's vertical engines.

The E. Horton & Son Co. inform us that the discount from price-list of the Sweetland Improved Horton Chuck has been fixed at 15%.

The belting trade held a meeting a day or two ago, and advanced the price of leather belting 10 to 15 per cent. The list remains the same.

The Cincinnati Exposition, just closed, awarded two silver medals, one for watchmakers' lathes and one for machinists' lathes, to the American Watch Tool Co., Waltham, Mass.

Among the special tools offered by Frasse & Co., 62, Chatham street, New York, we notice Beeman's hand drill for light drilling, the principle of which is the same as the bow drill. Also a light drill, the spindle of which is worked by a lever, and a spring is attached to counterbalance the weight of the spindle.

Hermann Boker & Co's Trenton Anvils have been advanced to 10¼ cents per lb.

It is thought Pipe Taps will be advanced in price soon.

We are informed that the N. Y. Twisted Drill Co of Brooklyn, have sold out, bag and baggage, to the Morse Co., New Bedford. This probably means higher prices in the near future.

Prices of Peter Wright's Anvils have been advanced abroad, necessitating an advance here of ¼ of a cent per pound.

Manufactured Copper and Sheet Brass are likely to advance soon. Sheet Brass is now quoted 10% discount from the standard list. It is believed the next move will be to net list. Copper Rivets and Burs now quoted 40% will doubtless sympathize.

Braziers' Solder, formerly 21c. per lb., is now quoted 25 cents, with prospect of going higher.

Patent Metallic Foundry Sieves have been advanced to discount 25%, instead of 33⅓ %, as formerly.

Darling, Brown & Sharpe have made a small advance in prices of their small tools, amounting to about 5 %.

D. Saunders' Sons, Yonkers, N. Y., under date of Oct. 15th, have issued a circular withdrawing all quotations on their goods, and promising to furnish prices on application. This means an advance in the prices of their Pipe Cutting and Threading Machines.

Prices of crude rubber have taken another stretch upward within the past week, and are to-day so unsettled that no definite price can be fixed. The Rubber Belting manufacturers hold a meeting on the first Wednesday in November, and it is thought will again advance prices.

Iron Review.

NEW YORK, Oct. 16th, 1879.

The demand still keeps up, showing no symptoms of falling off or softening in prices. The rise, which has been more especially in low grades, is now affecting the higher grades, and, owing to the continued advance in prices abroad, it now seems certain that whatever foreign iron has been contracted for will all easily enter into consumption here without causing any lower prices than those quoted to-day, while the advance bids fair to continue on both sides for some time to come. Some iron men think that prices may drop to a lower level after January 1st.

Pierson & Co., 24 Broadway, N. Y., quote prices out of store as follows:

No. IX Pig Iron, $31 per ton; Iron Rails, $46 to $55, according to weight; Old Rails, $31.50 to $32; Fish Plates, 3c. per lb.; Railway Spikes, 3½c.; Bolts and Nuts, 4¾c.; Common Bar Iron, 3c., basis from store; Refined, 3 2-10c., basis; Ulster, 3 8-10c., basis; Machinery Steel, 7c.; Best Tool Steel, 12½c.; Norway Bar Iron, 5½c.; Norway Shapes, 6c.; Nail Rods, 6 to 6½c.; Sheet Iron, 4¾c., basis; Angle Iron, 3¼c., Tee Iron, 4c.; Band Iron, 3 6-10; Hoop Iron, 3 8-10c.; Horse Shoe Iron, 3 8-10c.; Tank Iron, 4c.; C No. 1 Boiler Plate, 4¼c.; C. H. No. 1 ditto, 4¾c.; Best Flange ditto, 5½c.; Boiler Rivets, 4¾ to 6¾c.; Hot Polished Shafting in lengths, 2 ft. and longer, 7 to 8c., according to size; Small Black Rivets, 50% off in papers, 35% off in bulk.

A. B. Warner & Son, 28 West street, N. Y., quote to Boiler Makers on Boiler Plates, as follows: Tank, 4¾c.; C. No. 1, 4¾c.; C. H. No. 1. 5c.; Best Flange, 6c.; Rivets, 5c.; Sheet Iron, Nos. 10 to 16, 4¾c. basis.

We are informed that to-day's selling price of Boiler Tubes is 10% discount.

Metal Review.

LUCIUS HART & CO., 8 & 10 Burling slip, New York, furnish us the following under date of Oct. 16th, 1879:

The Metal Market is in such an excited state that quotations are given with reluctance, and *refusals* out of the question. Demand for consumption steady and increasing daily. Figures, that 10 days ago looked as fancy, are now considered very cheap, and still further advances looked for. London is excited, and with small shipments of Pig Tin from Singapore and Penang, the supply of Tin may fall short of actual demand. At present writing the following quotations are correct: Banca Tin, 27c.; Malacca and Straits, 25c.; Australian, 24¾c.; Refind English, 24¾c.; English, "L. & T," 22½c.; Bar or Strip Tin, 24c.; Pig Lead, 5¾c. for round lots to 6c., jobbing price. Antimony scarce—Cookson, 21c.; Hallett, 20c.; Spelter, Western brands, 6¾c. to 7c; Foreign, to arrive, 6¾c.; Ingot Copper, nominally. 22c.; Nickel, $1.50; Bismuth, $2.50; Solder, No. 1, 13c.; half and half, 15c.

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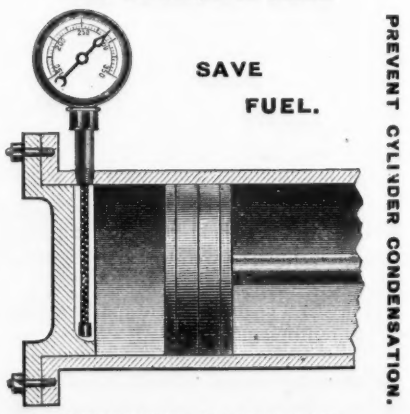

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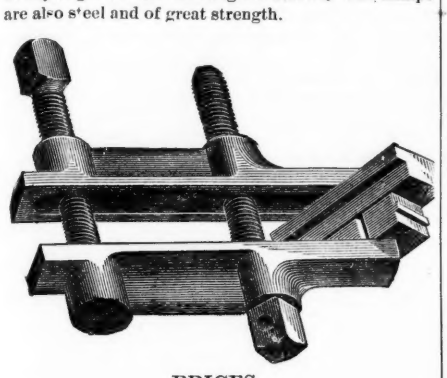

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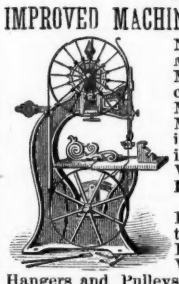

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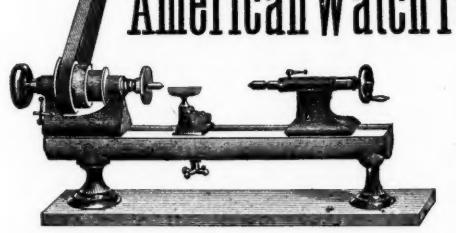

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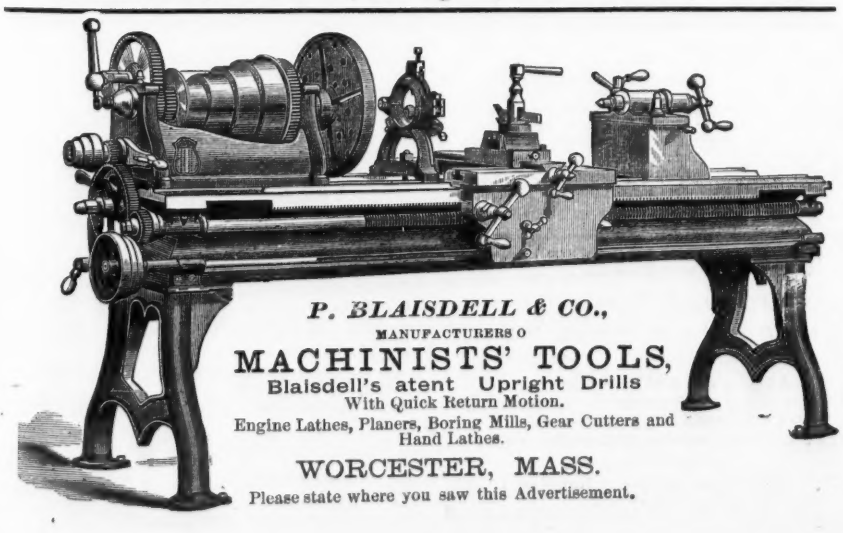

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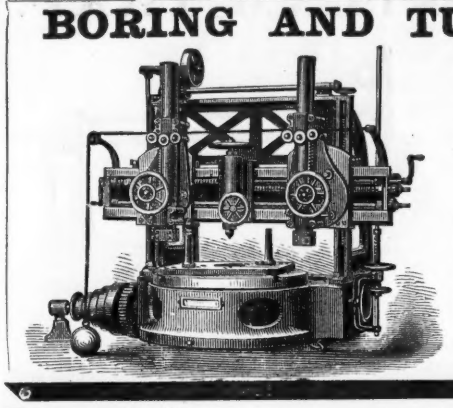

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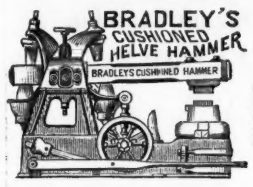

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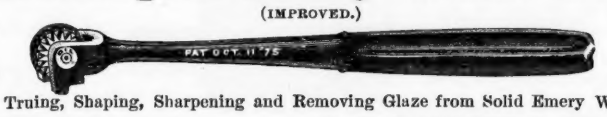

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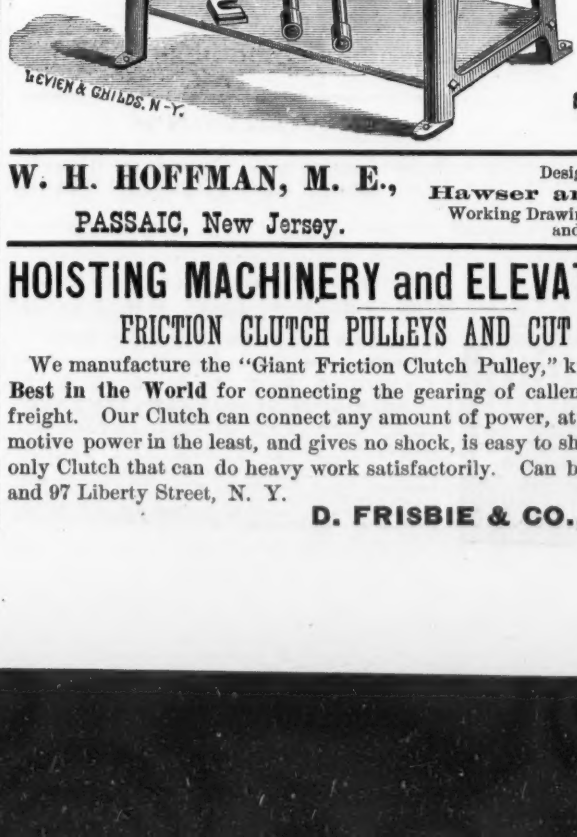

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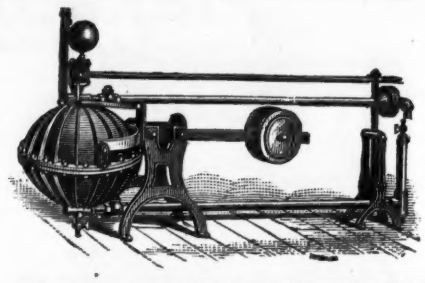

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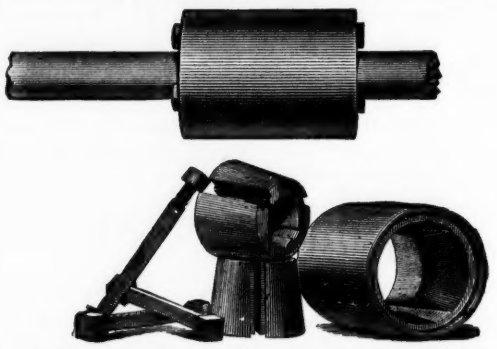

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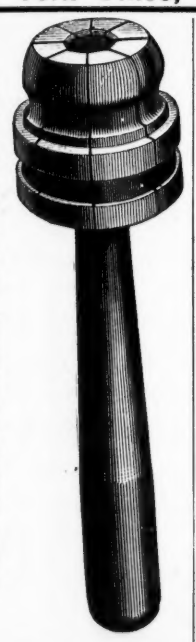

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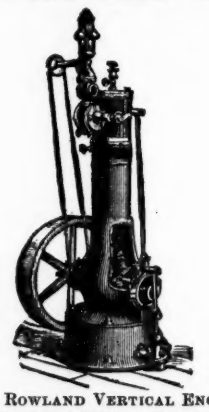

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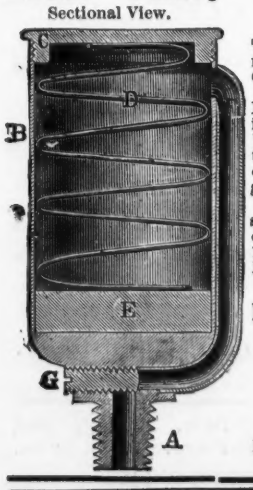

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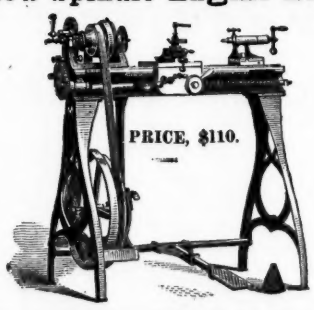

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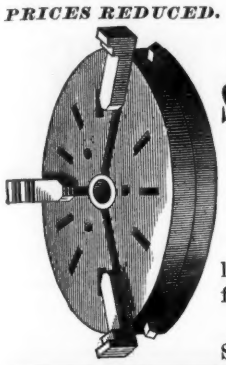

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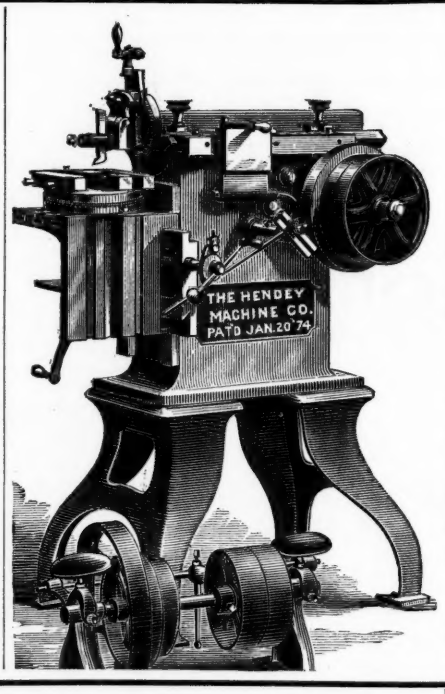

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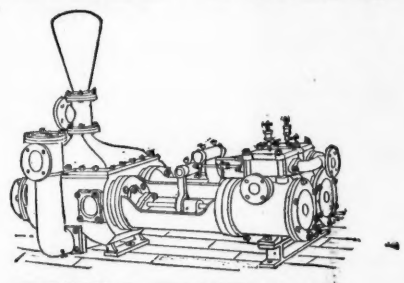

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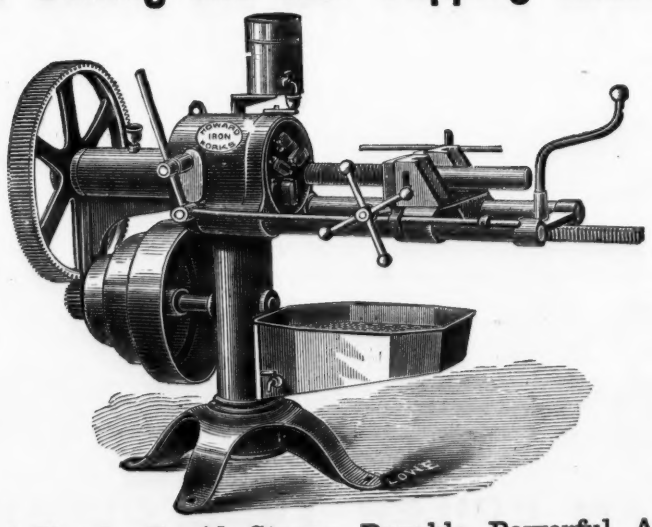

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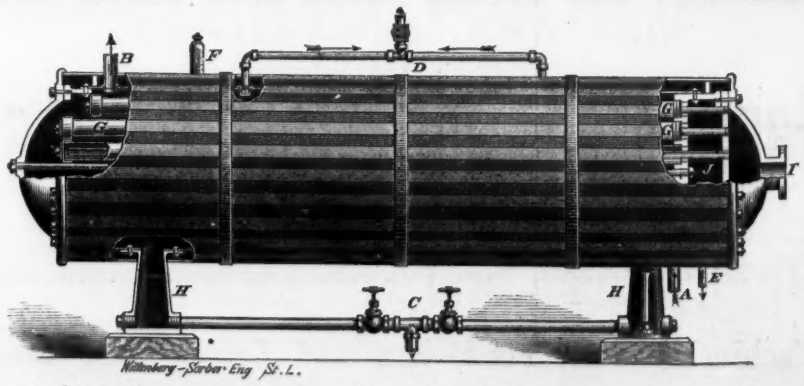

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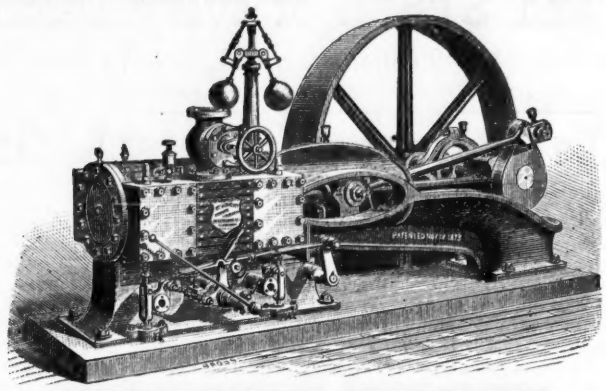

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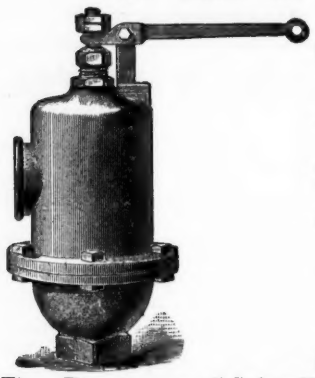

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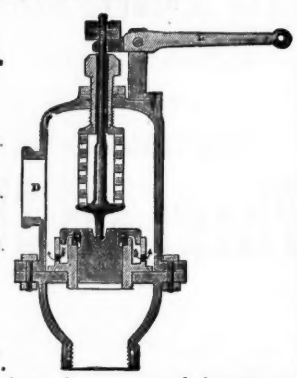

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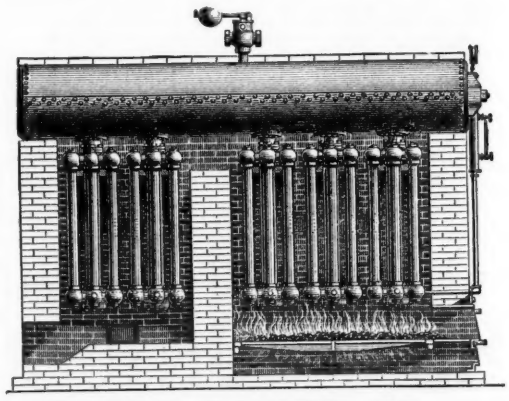

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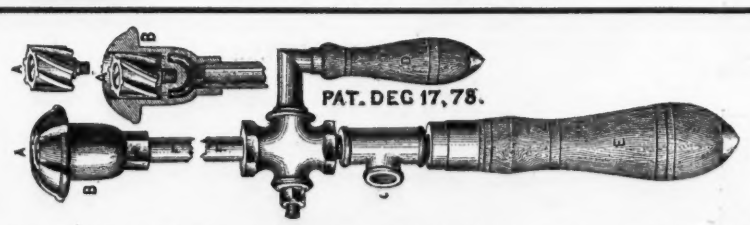

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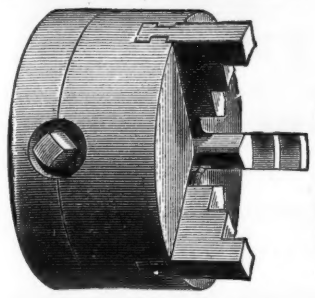

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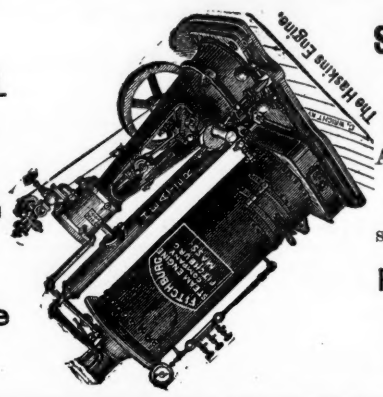

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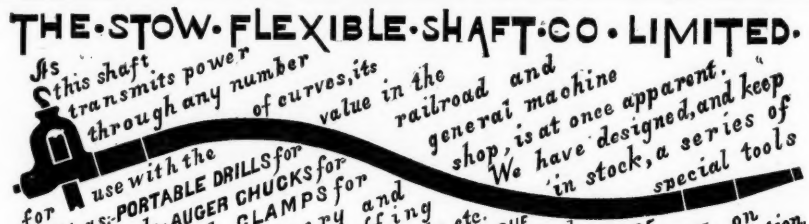
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Two Hand Lathes, 18 in. x 4½ ft.
One " " 15 in; x 8 ft. Pratt & Whitney.
One " " 13 in. x 5 ft.
Six " " 11 in. x 4½ ft. New Spencer.
Six " " 7 in. x 2½ ft. " "
One Planer, 48 in. x 48 in. x 12 ft. Good order. Plass.
One " 31 in. x 31 in. x 7 ft. New. Stover.
One " 30 in. x 30 in. x 8 ft. Whitcomb.
One " 30 in. x 30 in. x 7 ft.
One " 24 in. x 24 in. x 4 ft. W. L. & Co.
One Crank Planer, 24 in. stroke.
Two 8 in. stroke Shapers. Gould.
One 8 in. " " Pratt & Whitney.
One 24 in. " " Hendey Machine Co.
One Brown & Sharp Universal Milling Machine.
One No. 3 Garvin Milling Machine.
Five Lincoln Pattern Milling Machines.
One Putnam 36 in. Gear Cutter.
One Whiton 22 in. " "
One Pond's Index Millers.
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One Sensitive Drill, drills to 3-16 in. hole.
One Pratt & Whitney 2-Spindle Profiling Machines.
One Brown & Sharpe Tapping Machine.
One No. 3 Pratt & Whitney Screw Machine. Plain.
One No. 2 " " " " "
One No. 1 Brown & Sharpe " " Chasing Bar.
Two No. 2 " " " "
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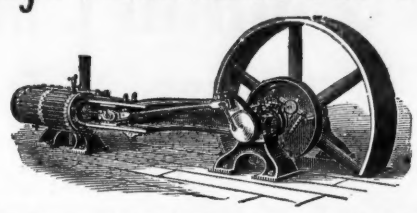

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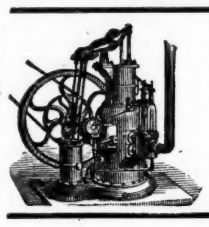

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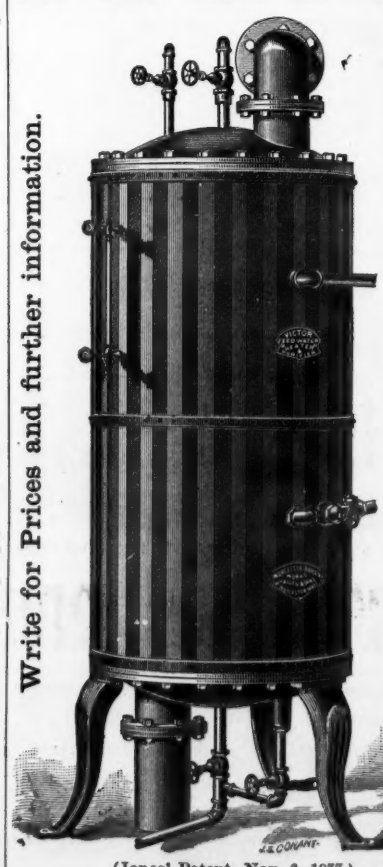

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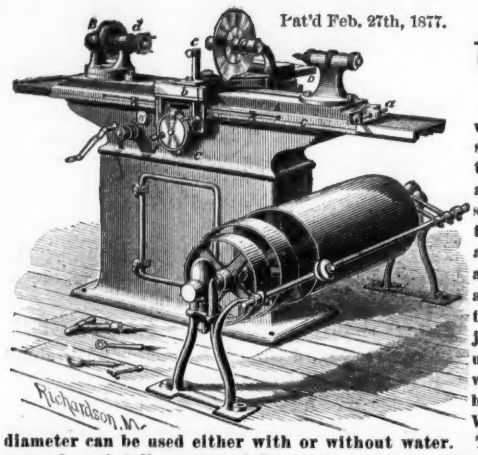

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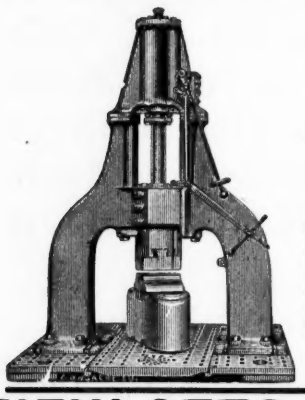

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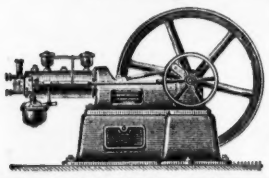

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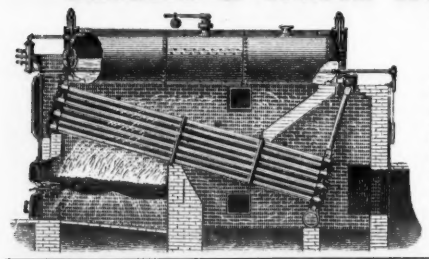

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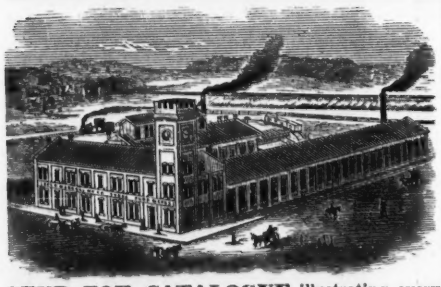

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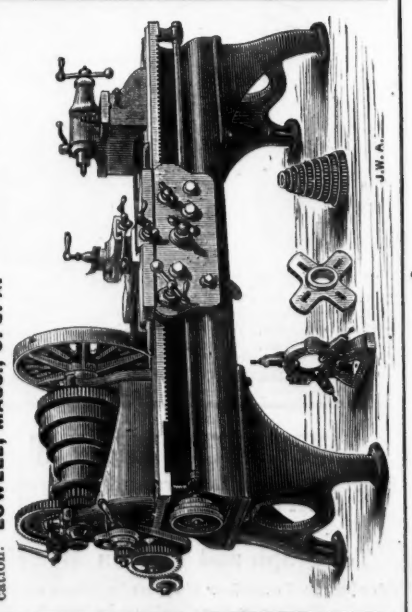

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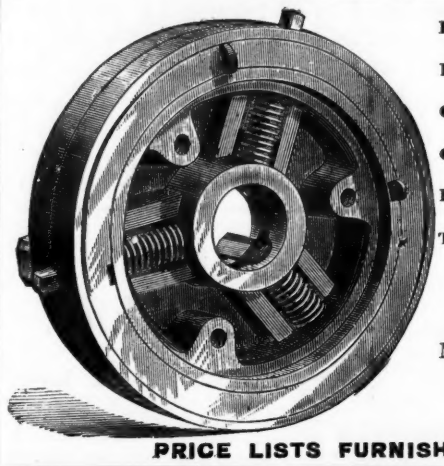

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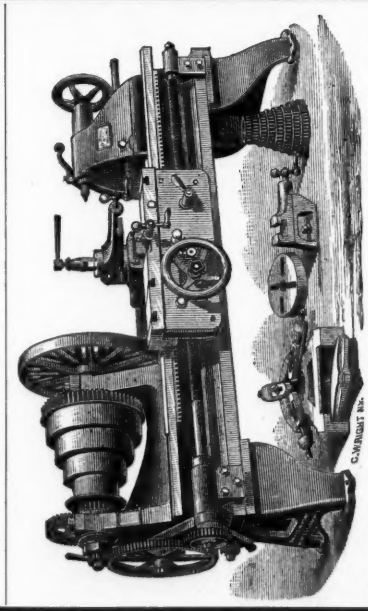

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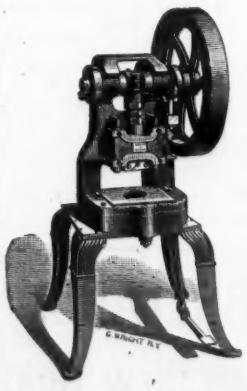

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